STATE LIBRARY OF PENNSYLVANIA
docs,pa PHE1.2061
Operations of the State Board
0 0001 00657169 7

PHE1.2
061

PHE 1.2
O61
CLASS ~~P389~~ BOOK ~~1.24~~

VOLUME

PENNSYLVANIA
STATE LIBRARY

Digitized by the Internet Archive
in 2015

https://archive.org/details/operationsofstat00penn

COMMONWEALTH OF PENNSYLVANIA.

THE STATE BOARD OF HEALTH.

THE OPERATIONS

OF THE

STATE BOARD OF HEALTH OF PENNSYLVANIA.

IN SUPPRESSING THE

EPIDEMIC OF TYPHOID FEVER IN BUTLER, PENNSYLVANIA,

IN 1903—1904.

Report of the Secretary, Including Minutes of the Board.
Report of Dr. Wilmer R. Batt, Quarantine Officer-at-Large,
Comprising Report of Services Rendered by Dr. John W.
Adams, Veterinarian to the Board, and Dr. T. N. Mc-
Kee, Quarantine Officer of the Board for Arms-
trong County and Report of George R. Har-
low, C. E., Engineer Inspector for
the Western District.

(Extracted From the Twentieth Annual Report of the State Board of Health).

WM. STANLEY RAY
STATE PRINTER OF PENNSYLVANIA,
1904.

PHE 1.2
O 61

THE TYPHOID FEVER EPIDEMIC AT BUTLER.

Report of the Secretary, Extracted from the Minutes of a Special Meeting of the State Board of Health, held at Philadelphia, February 27, 1904.

As will be recalled, the Board adjourned at Pittsburg to meet at Butler, in response to an appeal from the Board of Health and the Board of Education of that town and the County Medical Inspector, for aid in controlling an epidemic of fever which had defied the efforts of the local authorities to suppress it. The Board therefore visited Butler the following morning, conferred with representatives of the boards named, with leading physicians and other prominent citizens, visited many of those ill with the fever, and made an inspection of the water supply.

Based upon this investigation a resolution was adopted, declaring the disease to be typhoid fever and its cause to be pollution of the water supply, and urging the adoption of all the usual precautions. The Board was accompanied in this visit of inspection by Dr. Wilmer R. Batt, Quarantine Officer-at-Large, then on duty at Pittsburg with a view to the suppression of small-pox in Allegheny county. On the following Monday, Dr. Batt was instructed to remove his headquarters to Butler, assume entire control of the campaign giving the local board and authorities all necessary assistance, open an office in the name of the Board and establish a depot for disinfectants. Large quantities of carbolic acid, bichloride of mercury and formaldehyde put up in small packages for convenience in distribution, were at once forwarded. In order to thoroughly investigate the possibility that milk might be a factor in causing the outbreak, Dr. John W. Adams of Philadelphia, Veterinarian to the State Board of Health, was instructed to visit Butler, report to Dr. Batt and co-operate with him in this inquiry. It becoming evident that the exigencies were such as to require still farther assistance,

77364

Dr. T. N. McKee of Kittanning, County Quarantine Officer for Armstrong county, was also commissioned to report to Dr. Batt, and render him aid in every possible way. The Morse-Boulger Company was authorized to place a destructor for the destruction of typhoid excreta in one of the hospitals of the town. After consultation with the authorities it was decided to install it in the Butler General Hospital where there were many cases of fever and where it has been doing excellent service. Dr. Batt's relations with the local Relief Committee and with the Philadelphia Hospital Committee, were most cordial.

The following extract from a resolution of the Relief Committee indicates how thoroughly Butler appreciated his services and the interposition of the Board.

"As soon as it became known to the Public that Butler was up against a great typhoid epidemic, Doctor Batt representing the State Board of Health quietly came into our midst, and set about his painstaking and systematic method of gathering the facts concerning our water supply. He personally conducted the investigation of the water-shed of the Connoquenessing, and of the conditions that prevailed at the inception of the poison infection. He went to work to make himself thoroughly conversant with the situation, and stopped not until he was complete master of it. To do this, required an extraordinary amount of labor, in draining and flushing the water mains, in emptying and cleansing the reservoir on the hill, and in disinfecting the cess-pools into which he had gathered the germ-laden filth of the flats below town. And then followed up this preparatory work of sanitation, by making a thorough house to house canvass of all homes in which any of the inmates were stricken by fever; giving to all such, through the corps of trained nurses, the necessary and simple instructions that they needed in the best method of disinfection.

In my opinion, the work done by the State Board under the supervision of Doctor Batt, has done more to stamp out the typhoid epidemic of our town, than all other work beside."

Dr. Batt's report of the operations of the Board in Butler which is in considerable detail and accompanied by valuable maps and illustrations, is hereby presented with the recommendation that it be printed and distributed as early as possible.

Dr. George G. Groff moved that five thousand copies of the report of Dr. Wilmer R. Batt, on the operations of the Board at Butler, be printed for distribution, and that the report should also contain the report of the Secretary and the minutes of the Board, and the report of Geo. R. Harlow, C. E., Engineer Inspector to the State Board of Health for the Western District.

It was so ordered.

The expenditures of the Board in this connection have been met out of the general emergency fund with the approval of his Excellency, the Governor.

LETTER OF TRANSMISSAL.

Dr. Benjamin Lee, Secretary State Board of Health of Pennsylvania:

Sir: I have the honor to report that in compliance with your instructions of December 1, 1903, to visit Butler, investigate the epidemic of typhoid fever, confer with the Board of Health, assume entire control of measures to prevent the spread of the disease, investigate typhoid conditions in all neighboring towns, and take the necessary precautions to prevent the further spread of the infection, I immediately transferred my headquarters to Butler and have continued to represent the Board at this place up to the present time.

The following is a report in detail of the action which I have taken.

Yours truly,

(Signed.) WILMER R. BATT,
Quarantine Officer-at-Large.

Feb. 2, 1904.

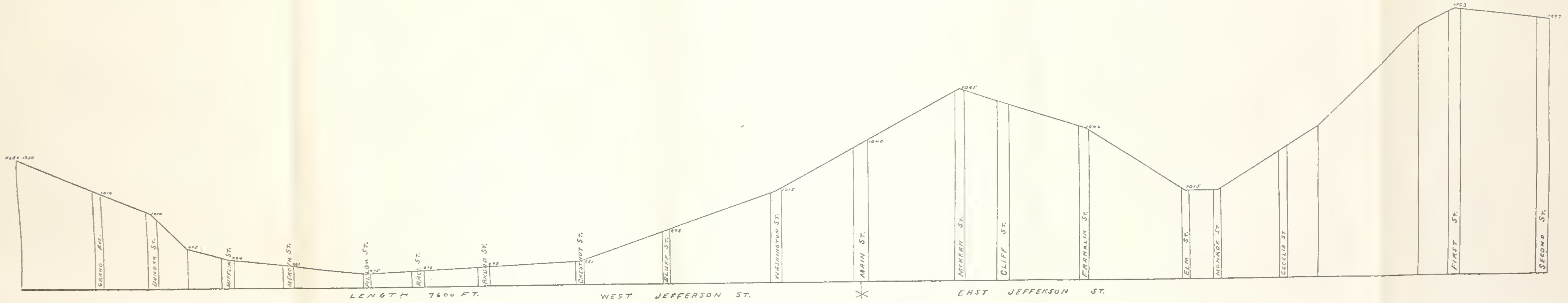
REPORT.

Dr. Benjamin Lee, Secretary State Board of Health, Philadelphia, Pa.:

Dear Sir: I have the honor to submit herewith a report of the operations of the State Board of Health at Butler, Pa., in connection with the epidemic of typhoid fever existing at that place, extending from December 2, 1903, to February 2, 1904, together with such statistics concerning the epidemic, maps, etc., as I have considered to be of interest. In presenting this report, I desire to acknowledge the great value of the services rendered by Dr. John W. Adams, of the University of Pennsylvania, Veterinarian, and Dr. T. N. McKee, County Quarantine Officer for Armstrong county, Pa., both of whom were detailed by you to assist in this work. Dr. Adams made a very thorough inspection of the milk supply including the dairies producing milk as well as the distributing depots. Dr. McKee made a careful inspection of the water sheds of the Thorn Run and Boydstown reservoirs and the Connoquenessing Creek, thereby determining the exact sources of pollution which created the epidemic. In addition to this work, both of these gentlemen assisted in making a careful sanitary inspection of the premises in which typhoid fever existed throughout the borough and by their efficient work, contributed in bringing the operations of the State Board of Health to a rapid and successful conclusion.

LOCATION AND HISTORY OF BUTLER.

The borough of Butler, the county-seat and principal town of Butler county is located on the Connoquenessing creek, in Butler township, thirty-nine miles by rail from Pittsburg, and has an average elevation of one thousand and fifty feet above the level of the sea.



Sectional View of Butler on Line of Jefferson Street.

Dr. Be

Dear
operati
tion wi
tending
such st
sidered
acknow
W. Ad
T. N.
both o
Adams
ing th
Dr. M
Thorn
Creek,
create
men as
in whi
efficien
Board

The borough of Butler, the county-seat and principal town of Butler county is located on the Connoquenessing creek, in Butler township, thirty-nine miles by rail from Pittsburg, and has an average elevation of one thousand and fifty feet above the level of the sea.

The land upon which it is located was owned originally by the patriot financier of the Revolution, Robert Morris. The town was named "Butler" in honor of General Richard Butler, a distinguished soldier of the Revolution, a large part of whose life was spent in the western part of Pennsylvania.

The act authorizing the creation of Butler county was passed by the Legislature of Pennsylvania on the 12th day of March, 1800, and one of its provisions was that the place for holding courts should be located at some point not more than four miles distant from the centre of the county. This provision necessarily restricted the territory in which the seat of justice might be located. Notwithstanding this restriction, however, considerable rivalry developed between the owners of several tracts of land in their endeavor to secure the town site.

Commissioners were appointed by the Governor to locate the Seat of Justice, and one of them, impressed with the natural advantages of the district upon which was afterwards located the town of Butler, writes under date of June 7, 1802, concerning it as follows:

"The situation is beautiful, being on an eminence which descends in all directions, scarce of timber, but sufficiently dry, and large bodies of meadow land near the seat; this site will have the advantage of the creek, with many good springs of water and coal-banks near; lime-stone and free-stone quarries partly adjoining the city. Ridges all pointing into the little valley will be convenient for roads in every direction."

This site was ultimately chosen by the Commissioners and the selection was approved by the Legislature of Pennsylvania on the 8th day of March, 1803. The original plot of the town was made in August, 1803, and embraced seventy-eight acres and nine perches of land.

The eminence spoken of in the letter of one of the Commissioners and on which the court house was subsequently built, as well as the sloping ground from this point is well defined in the sectional maps. Butler has, however, long since ceased to solely occupy this eminence originally considered ample for the town, and has overflowed the valley and populated the opposite hillsides. The settlement located at this point was incorporated into a borough February 26, 1817, and the borough charter was issued on May 2, 1817.

The growth of the town from the date of its location until the year 1900 was of a slow and permanent character, and the population as given by the census of that year was 10,853. The present population including the settlement of Lyndora, just beyond the borough line is estimated to be 18,000. This increase in population of 75 per cent. in three years entitles Butler to be classed as a "boom" town, the increase being the direct result of the establishment of the large manufacturing plant of the Standard Steel Car Company, which employs about 3,000 men, and which began operations in 1902. With the exception of the Lyndora district, the population is almost exclusively American-born, a large percentage of the employes of the Car Company are foreign-born, and of recent arrival in this country, so that of the 18,000 population referred to above, at least 4,000 of this number are aliens.

The principal industry of the town aside from the Standard Steel Car Company is the Standard Plate Glass Company, employing about 600 men, and which has been in operation for more than fifteen years.

The surrounding country is a rather sparsely settled farming district, but the location of the town in the centre of large oil, coal and gas fields has contributed materially to its prosperity. Its railroad facilities are excellent, the Pennsylvania, Baltimore and Ohio, Buffalo, Rochester and Pitsburg, and the Pittsburg, Bessemer and Lake Erie lines all enter the town.

The borough is separated at the present time into five wards, which about equally divide the population into as many parts. It has about eight miles of well paved streets, electric passenger railway, and electric lighting plant in addition to natural gas which is used for lighting purposes as well as for fuel.

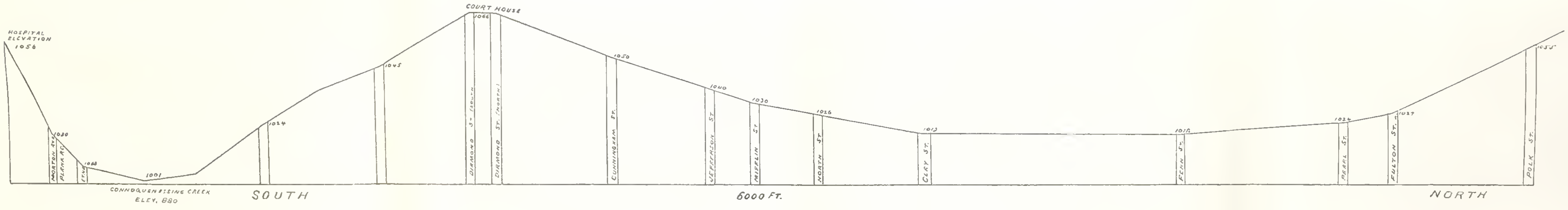
The sewage system is designed for house drainage only, and about 60 per cent. of the residences have sewer connections, the balance using earth closets. The streets are broad, the houses substantially built of brick and of frame, surrounded usually with well shaded terraced lawns, and the town presents a general aspect of natural beauty and prosperity.

The health of the borough has been good up to the present time, and the death rate as shown by the accompanying table uniformly low, no single disease contributing more than its normal quota of fatalities until the occurrence of the present epidemic.

	Population.	Total deaths from all causes.
1895,	8,800	133
1896,	8,900	117
1897,	9,000	139
1898,	9,500	138
1899,	10,000	116
1900,	*10,853	131
1901,	13,000	143
1902,	16,000	165

---

*Census.



Sectional View of Butler on line of Main St with Elevations above Sea Level.

Sectional View of Butler on Line of Main Street, with Elevation above Sea Level.

facturing plant of the Standard Steel Car Company, which employs about 3,000 men, and which began operations in 1902. With the exception of the Lyndora district, the population is almost exclusively American-born, a large percentage of the employes of the Car Company are foreign-born, and of recent arrival in this country, so that of the 18,000 population referred to above, at least 4,000 of this number are aliens.

The principal industry of the town aside from the Standard Steel Car Company is the Standard Plate Glass Company, employing
about 600 men
years.

The
trict, b
gas fiel
faciliti
Buffalo
Lake E

The
which
has abo
way, an
used fo

The
about 6
balance
stantiall
shaded
natural

The h
and the
low, no
fatalities

	lation.	all causes.
1895, ...	8,800	133
1896, ...	8,900	117
1897, ...	9,000	139
1898, ...	9,500	138
1899, ...	10,000	116
1900, ...	*10,853	131
1901, ...	13,000	143
1902, ...	16,000	165

---

*Census.

THE WATER SUPPLY OF BUTLER.

The water supply of Butler at the present time is derived from three sources, first, private wells, second, the supply of the Butler Mutual Water Association. third, the supply of the Butler Water Company.

First. Previous to 1877 the water supply was obtained exclusively from private wells, some of which were driven to a depth varying from 40 feet to 80 feet, but the large majority of which were shallow dug wells. At the present time it is estimated that three hundred of these wells are in existence and their supply in part or wholly used by as many families.

Second. The Butler Mutual Water Association was organized in 1891 and since beginning operations in that year has drilled five wells at an average depth of 250 feet. The water from these wells is stored in two reservoirs, one having a capacity of 2,400 barrels and the other of 250 barrels, into which it is lifted by hot air pumps. The operations of this company have been confined exclusively to the Springdale district, or what is known as the first ward of Butler, and at the present time water is being supplied to one hundred and fifty-two residences in this part of the borough.

Third. The Butler Water Company was chartered on November 1, 1877 and the town was piped and a reservoir of 3,000,000 gallons capacity was built in 1877 and 1878. The water was derived from the Connoquenessing Creek at the site of the present pumping station. For a period of twenty years, or from this date until the year 1897 the water from this source was used exclusively by this company. In 1896 the waters of the Connoquenessing creek became polluted with salt water which escaped from wells which had been drilled at various points in its water shed. The water supply of the town, in consequence of this pollution became so unsuitable for domestic use that equity proceedings were instituted in the county court to compel the water company to secure its supply from some other source. As a result of the decree of the court, in the early part of 1896 the water company began the construction of an impounding reservoir in the vicinity of Boydstown. This reservoir is located about seven miles from the borough of Butler, and has a drainage area of 9,008 acres. This water shed in reality comprises the head waters of the Connoquenessing creek.

From this reservoir water was carried by gravity through a terra cotta pipe to a receiving well at the pump station, and from that point it was pumped into the borough reservoir.

The construction of the Boydstown reservoir was completed in the latter part of 1896 and water drawn from it at that time. The breast of this reservoir was constructed of clay without a core wall and with an inadequate spillway. Following a heavy rainfall in July, 1897, one-half of the breast was carried away. The work of reconstruction was immediately begun, using rubble stone laid in cement as a core wall, and was completed in November, 1897. From the date of its destruction in July, to December 1, water was again pumped from the Connoquenessing creek at the pumping station.

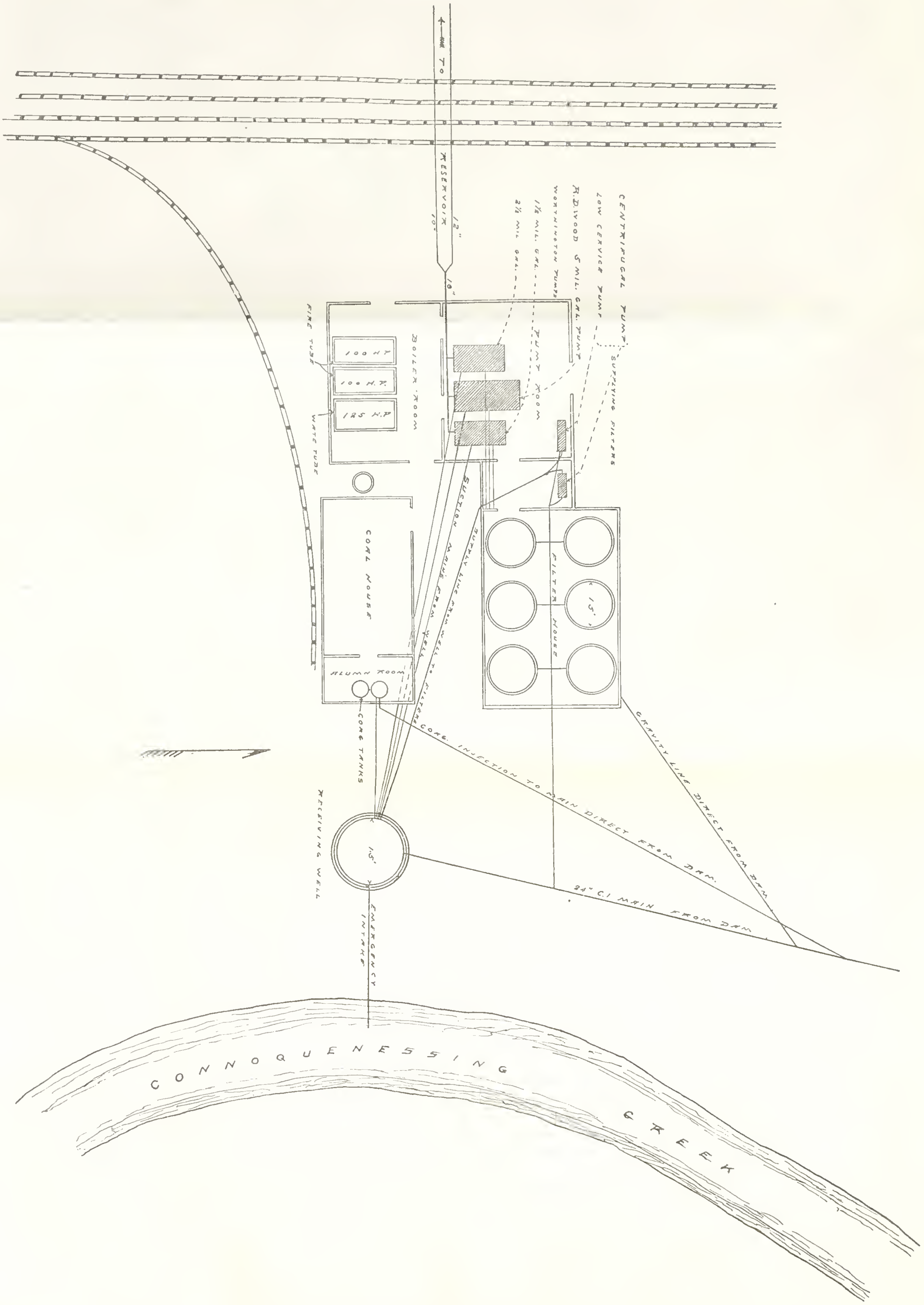
In July, 1897 the stock of the Butler Water Company was purchased by the American Water Works and Guaranty Company, which has owned and operated the plant from that date to the present time.

Water from this source was used continuously from December 1, 1897 until the 28th day of August, 1903, at which time the Boydstown reservoir was again destroyed, an unusually heavy rainfall of 3.44 inches having occurred from 10 A. M. August 27 until 10 A. M. August 28. The section of the breast-work carried away at this time was that part of the original work which had been undisturbed by the flood of July, 1897. The work of rebuilding this section was commenced immediately. A core wall of concrete was constructed, the spillway was enlarged, and two blow-off valves of 16 and 24 inches respectively were provided. This work was completed about December 1, 1903, but water was not drawn from this source until December 19, and then, only for a period of four days.

In the early part of 1903 the Water Company began the construction of an impounding reservoir on Thorn Run, a tributary of the Connoquenessing, about two and one-half miles from the pumping station, which was designed to collect the water from the head waters of Thorn Run, and to act as an emergency supply in connection with the Boydstown reservoir. The drainage area included in the Thorn Run reservoir consists of 4,163 acres. From this reservoir cast iron pipe was laid to a junction with the terra cotta line from the Boydstown reservoir, and from this point to the pumping station the terra cotta line was replaced with cast iron pipe, giving a continuous line of iron piping from the Thorn Run reservoir to the pumping station. The Thorn Run reservoir was completed and water first drawn from it for distribution on November 15, 1903.

From the time of the destruction of the Boydstown reservoir (August 28) until the completion and use of water from Thorn Run reservoir, on November 15, water was taken directly from the Connoquenessing creek through the emergency intake at the pumping station.

The pumping plant of the water company consisted until December 15, 1903, of two Worthington high service pumps with an original



Plan Showing Pumping Station, with Filter House.

daily capacity of 2,500,000 gallons. Constant use for a number of years had, however decreased the combined actual daily capacity of these pumps to about 3,000,000 gallons. In the meantime, owing to the rapid increase in population of Butler, the average daily consumption of water had increased to 3,000,000 gallons, and we are informed that the reservoir in November, 1903, contained only one day's supply, and that it required twenty-four hours constant pumping to maintain this amount of water.

The increased demands made upon the water company during 1903 are best illustrated by the records from the books of the water company, which show that the daily consumption of water in 1901 averaged one and one-fourth million gallons, in 1902, one and one-half millions gallons, and in 1903, three million gallons.

The equipment at the pumping station contained in addition to the pumps mentioned above, a low service pump which was used for the purpose of lifting the water from the receiving well to the filters.

In the summer of 1903, in order to meet the increased demand for water, the company began the installation of an R. D. Wood high service pump of about 5,000,000 gallons daily capacity. Owing to delay in the delivery of certain connections, this pump was not available for use until December 15, 1903. At the same time, the low service pump had been supplemented by one of centrifugal type.

THE FILTER PLANT.

In May, 1902, the water company installed at their pumping station a mechanical filter plant which was placed in operation in July of the same year. The plant consisted of four open gravity filters, fifteen feet in diameter and eight feet in depth. The filters are built of steel and contain six inches of gravel, and three and one-half feet of natural sand, part of which has been obtained from Red Wing, Minnesota, and part from Norfolk, Virginia. An average depth of one and three-fourths feet of water is maintained on the sandbeds of the filters, and the filtered water is collected in a concrete basin beneath them: The natural head of the water on the filter beds is about neutralized by the frictional resistance presented by the sand, and the operation of filtration is facilitated by carrying the effluent beneath the surface of the water in the collecting basins, through a pipe terminating in a syphon point, which creates a negative head equivalent to a gravity pressure of about nine feet.

The depth of water on the filters is maintained at a uniform heighth by butter-fly valves in the supply pipes connected with floats on the surface of the water. Sulphate of Alumina is used as a coagulant, a solution of which is pumped into the supply main from the reservoirs by means of a water jet injector at a point 125 feet from the filters. The amount of coagulant used has varied from one-half grain to one and one-third grains per gallon of water, according to the turbidity of the supply, the average amount being three-fourths of a grain per gallon.

In June, 1903, owing to the increased demand for water, the filter plant was increased by the addition of two filter tanks corresponding in size, construction and operation to those already in use. The capacity of each filter is estimated at 750,000 gallons per day, although they are not called upon to filter more than 500,000 gallons each. Each filter is washed twice daily by means of a reverse current of water, and the waste is carried to a sewer drain emptying into the Connoquenessing. The filters were supposedly in continuous operation from July, 1902, until October 20, 1903, at which time the service was interrupted for several days, to permit the connection of new pipes from the Thorn Run supply, and also to connect the suction lines from the new pumps to the filtered water basins. This work occupied a period of twelve days, and the filters were again placed in operation on November 3. The possibility of there having been a suspension of filtration for other brief periods in the early part of October will be referred to later. Briefly summarized the water supply of Butler, provided by the Butler Water Company from the date of its organization to December 15, 1903, was as follows:

From 1876 to 1896, Connoquenessing creek, unfiltered.

From 1896 to July 1897, Boydstown reservoir, unfiltered.

From July, 1897, to December, 1897, Connoquenessing creek, unfiltered.

From December, 1897, to July, 1902, Boydstown reservoir, unfiltered.

From July, 1902, to August 28, 1903, Boydstown reservoir, filtered

From August 28, 1903, to October 20, 1903, Connoquenessing creek, filtered (?).

From October 20, 1903, to November 2, 1903, Connoquenessing creek, *unfiltered.*

From November 2, 1903, to November 15, 1903, Connoquenessing creek, filtered.

From November 15, 1903, to present date, Thorn Run reservoir, filtered.

TYPHOID FEVER IN BUTLER.

The records of cases and deaths from typhoid fever in Butler as recorded by the local Board of Health from January 1, 1900, to November 1, 1903, are as follows:

Month.	1900.		1901.		1902.		1903. Jan. to Nov.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
January,			1				1	
February,	2							1
March,			3				1	1
April,			4					3
May,	1	1						1
June,	1		4	1				1
July,	9	2	2		3	2		
August,	2		3		5			
September,	9	2	5		2			
October,	7	1	6		11			
November,	9	1			2	2		
December,	2	2			3			
Total,	42	9	28	1	26	4	2	7

These figures are unquestionably unreliable, as the reports for 1900 show a mortality of 21.5 per cent., so large in fact that the natural presumption is that many cases were unreported. Further evidence of this unreliability may be found in the record for ten months of 1903 in which two cases and seven deaths are reported. The acceptance of five death certificates for cases of typhoid fever which were obviously unreported to the local Board of Health is undisputable evidence of the slight regard in which the necessity for such reports was held. Such information, however, as may be derived from the foregoing report indicates that typhoid fever has existed annually in Butler as a late summer and autumn visitor, during 1900, 1901 and 1902, a period which corresponds to the least rainfall, also the period in which typhoid is usually most prevalent throughout the country.

During the first week of November, 1903, rumors of the occurrence of an unusual number of cases of typhoid fever reached the Board of Health of Butler. Although the borough ordinance required physicians to immediately report cases of this disease occurring in their practice to the local Board of Health, it had been more honored in the breach than the observance, so that the local authorities found themselves at this critical period, without the official information which would enable them to determine the exact extent of the disease. The unofficial reports however, of a large number of cases seemed so well founded that the local Board of Health, together with the county medical inspector began an investigation on November 7, with the result that several cases of typhoid fever were discovered within the drainage area of Thorn Run Reservoir.

On November 9, the following communication was published in the daily papers of Butler:

"The Butler Board of Health and Dr. J. E. Byers, Medical Inspector, to the State Board of Health for Butler county, have been investigating and trying to ascertain, if possible, the cause of typhoid fever in Butler. It is needless to say that this has been quite an undertaking, requiring much time and work, and while we are not yet prepared to say positively what the source of infection is, we want to urge our citizens to use every reasonable precaution in averting the disease. We are not certain that our water supply is responsible for any of the cases, but it might be. After the breaking of the Boydstown dam, the water company was taxed to the utmost to supply the town with water. It was compelled to furnish water and made great efforts to furnish the best it could obtain, and at the same time the company pushed the work on the new dam as fast as possible in order to furnish an ample supply of good and pure water.

Let it be understood that the Board of Health would not for one minute say that a single case of fever has been caused by using city water, yet it finds several cases of typhoid fever on a hillside sloping towards tributaries of the new dam from which some of the water has recently been pumped, and close enough to cause alarm. The Water Company as soon as advised by the Board of Health set to work a force of men fortifying the dam against the ingress of any water from that source, which work is being pushed radily forward.

Under the circumstances the Board of Health and the county medical inspector, until further notice through the local papers, hereby caution the consumers of city water for their own protection, against its use for drinking purposes without first boiling it.

The public will please bear in mind that all the water available for the company to furnish until there is rain, is the water in the Connoquenessing creek, and the small amount collected in the new dam. People must have water of some kind. We believe the water company is doing the best it can under the circumstances, and as soon as sufficient rain falls to fill its dams, water is expected to be both plentiful and healthful, but until such time the Board of Health deems it a duty to not only advise, but to urge the boiling of water as a precautionary means.

J. M. LEIGHNER,
President of the Board of Health.
JNO. E. BYERS,
County Medical Inspector.

The precaution of boiling water, advised in this article was further commented upon, and its importance urged, in newspaper publications of November 10. On November 11, the situation was considered of sufficient importance to be the subject of a special meeting of the School Board of the borough at which time it was decided to supply all the schools with apparatus for providing boiled water for the pupils.

On November 14, the Butler Daily Times published an article headed as follows:

WATER CONTAINS NO FEVER GERMS.
Tests of Butler Water Made by a Famous Pittsburg Expert
Proves that the Local Water Supply Furnished
By Butler Water Company is Free
From Fever Taints.
WATER WRONGLY BLAMED WITH DISEASE.

In which it is further stated that:

"A test made by a bacteriologist, of water drawn from the public supply had shown it to be absolutely free from any fever germs or other deleterious substances whatever, and not injurious to health in any way."

Also that:

"The cause of the disease is of course, a mystery now that the water supply is taken from the question, and is one of the things that medical science is as yet unable to discover. If the causes of disease could always be promptly located, there would be but little sickness of any kind, anywhere, and it will probably be a long time before the science of medicine will reach that stage of advancement, even though it is continually making wonderful discoveries in every branch of the profession. It is certainly a comfort for Butler people to know that they can again drink water without first having to spoil it by the boiling process."

On November 16, the following communication was addressed to the editor of the Times, and published in the edition of that date, together with a communication from the county medical inspector and the Secretary of the State Board of Health:

Mr. Editor: With your permission I desire to say a few words on behalf of the Butler Board of Health in relation to the article in Saturday's Times, in which it may be inferred that it advises the people to set aside the advice given by the local Board of Health "to boil the water used for drinking purposes," as a precautionary measure against typhoid fever.

When the Board of Health advised the boiling of water, it did so advisedly and after much investigation and consultation with physicians and others, as well as closely investigating the situation. The Board felt it a duty to warn the people of the probable danger, and to advise them to take the precautionary measure of boiling the water, which could certainly harm no one. By reference to our proclamation you will see that the Board of Health did not say positively that the water supply was the cause of typhoid fever in Butler, but said "it thought it might be," and after all that was said in Saturday's Times, it hereby repeats its warning. Boil the water. (The State Board of Health recommends the boiling of all water for drinking purposes in the fall of the year when the waters are low, as a preventative against typhoid fever). That proclamation also states that the "conditions along the tributaries to the water supply was such as to cause alarm"..four cases were found on the hillside of the dam from which a small amount of water has recently been pumped, and a number of cases along the tributaries leading into the Connoquenessing creek from which a part, and probably much the larger part of the water for Butler is supplied, besides many other objectionable features on said tributaries and near the place where the water is pumped from. The Board of Health found no fault with the water company on account of its being compelled to pump water out of such a creek, because there was no other source of supply for them to pump from. Just now they are obliged to pump part of the water from the creek at the pump station, and will be compelled to do so much of the time until there is rain to fill the Thorn Run dam. If any citizen will go out to the creek and its tributaries in the immediate vicinity of the pump station and then want to drink the water without first boiling it, the Board of Health will not quarrel with him, especially for the water.

Regarding the test of the water referred to in your article, the Board has nothing to say further than at that particular time and for several days previous, water was being supplied from the dam on Thorn Run, where great precaution was taken to keep it pure, and possibly the test could not be considered a decisive one.

One drawing of water would not be considered by the Board of Health a satisfactory test under the circumstances, as the water has been supplied different days from different sources. There has been no difference of controversy between the Board of Health and the Water Company for the Board of Health believes the Water Company is doing all it can under the existing conditions, to supply pure water and as soon as rain falls to wash out the creek and fill he dams, our water supply should then be such that we can boast of, but until then, the Board of Health advises all citizens of Butler for the benefit of whose health it is laboring keep on the safe side, use reasonable precaution. Boil the water until advised further by the Board of Health.

Yours truly,
J. M. LEIGHNER,
President Board of Health.

"I hereby endorse all that has been said above, and further hereby append telegram received from Dr. Benjamin Lee, Secretary of the State Board of Health.

JOHN E. BYERS."

Philadelphia, Pa., November 15.

Dr. John E. Byers, County Medical Inspector:

Until exact source of epidemic of typhoid is discovered, all drinking water should be boiled.

BENJ. LEE, M. D.,
Secretary Board of Health.

In an article published in the Butler Times, Tuesday, November 17, there is expressed an uncertainty as to the character of the disease which was affecting so many of the citizens of the town as follows:

"At present there are said to be something like 400 cases of illness in the town, but it is probable not more than 20 per cent. of them are actual cases of typhoid, though in most cases there are symptoms of that disease."

On the 18th of November, at the suggestion of the local Board of Health, the Water Company began the flushing of the fire hydrants, and in the columns of the Butler Times of that date the people are advised to continue boiling the water. In the issue of November 23rd, of the same publication, the existence of a great number of cases of typhoid fever is admitted, and the following statement is made:

"The situation is certainly a serious one, and justifies the Board of Health in going to any expense and in ordering every precaution, and care in trying to cope with the disease."

That the situation was rapidly growing worse, and impressing itself upon the public at large is shown by an article in the same publication of Wednesday, November 25, in which it states that "the present situation is the most serious crisis the town has ever known, and no expense will be too great for the city to undergo if a single life should be saved. It is undoubtedly time that action should be taken; there should no longer be any delay, but the best of expert knowledge should be employed in order to safeguard the public."

On November 25, a special meeting of the school board together with representatives of the local Board of Health was held and a joint telegram was sent to the Secretary of the State Board of Health asking for an investigation of the causes of typhoid fever and to take such measures as would aid in abating the same.

In response to this message the State Board of Health visited Butler on November 28, made a personal investigation of the conditions existing, and issued the following statement:

"Whereas, After receiving detailed information from the Board of Health, the School Board, and prominent physicians and citizens of Butler, and after a careful inspection of the water supply of the Butler Water Company, we are unanimously of the opinion that the pollution of the water in use in the greater part of the borough is the principal, if not the only cause of the present epidemic; and that the pollution of the water in use in these sections of the borough was caused by the existence of clearly traced cases of typhoid fever in close proximity to the reservoir, the Thorn Run dam and the stream, be it,

Resolved, First—That we heartily endorse the action of the Board of Health of Butler in requesting citizens to boil all the water for domestic purposes before using, and to continue to do so until absolutely assured of its purity by the local authorities.

Second—That we urge upon the Board of Health the importance of immediately establishing a careful system of registration of cases of typhoid fever, past, present and future.

Third—That we urge upon the Butler Water Company the duty involving upon them of policing the water sheds included in their supply and causing to be removed any possible source of pollution. And we further recommend that the company provide frequent chemical and bacteriological examinations by competent experts and that the result of the same be reported promptly to the local health authorities."

Realizing the enormous extent of the epidemic, although accurate statistics were unavailable, even at this late day, the State Board of Health, as a result of this investigation determined to assume control of the sanitary work necessary in connection with it, and with this end in view dispatched representatives to Butler on December 1.

This work resolved itself into first—an examination of the present water supply; second—the removal of all polluted water from the reservoir and pipes which might continue to act as a source of infection; third—an examination of the water shed of the Connoquenessing creek and particularly the drainage areas of the Thorn Run and Boydstown reservoirs; fourth—an investigation of the milk supply; fifth—the distribution of disinfectants to infected houses and instructions in regard to their use in order to prevent cases of secondary infection; sixth—an investigation of the sanitary conditions existing in each infected house; seventh—the disposal of sewage from houses occupied by foreigners in which it would be impossible to secure disinfection in individual cases; eighth—a determination of the extent and mortality of the epidemic.

EXAMINATION OF THE PRESENT WATER SUPPLY.

As has been previously stated, beginning November 15, water was taken from the Thorn Run reservoir for distribution. This has continued to be the source of supply with but a partial supply for four days from the Boydstown reservoir, beginning December 19, and which was made necessary by the low stage of water in the Thorn Run reservoir. This water was passed through the mechanical filters before being supplied to the consumers. Mr. F. W. Witherell, Sanitary Engineer was placed in charge of the operation of the filter plant on December 2. Daily bacteriological examinations were made of this water after this date, from samples taken before and after filtration, also of samples taken from the several reservoirs and from various points throughout the borough, with the following results:

RESULTS OF EXAMINATIONS MADE OF SAMPLES OF RAW WATER TAKEN FROM FILTER BEDS, AND FILTERED WATER TAKEN FROM TAP CONNECTED WITH RESERVOIR SUPPLY.

Three-fourths of a grain of alum per gallon of water used as a coagulant up to December 2, at which time it was increased to one and one-third grains per gallon.

Date.		Bacteria.	Coli communis.
Dec. 2,	R. W., A. M.,	620	Negative.
	R. W., P. M.,	460	Negative.
	F. W., A. M.,	37	Negative.
	F. W., P. M.,	14	Negative.
3,	R. W., A. M.,	53	Negative.
	R. W., P. M.,	110	Negative.
	F. W., A. M.,	15	Negative.
	F. W., P. M.,	21	Negative.
4,	R. W., A. M.,	78	Negative.
	F. W., P. M.,	7	Negative.
5,	R. W., A. M.,	38	Negative.
	R. W., P. M.,	73	Negative.
	F. W., A. M.,	6	Negative.
	F. W., P. M.,	11	Negative.
7,	R. W., P. M.,	55	Negative.
	F. W., P. M.,	15	Negative.
8,	R. W., A. M.,	98	Negative.
	F. W., A. M.,	7	Negative.
	F. W., P. M.,	12	Negative.
9,	R. W., A. M.,	310	Negative.
	F. W., A. M.,	13	Negative.
	R. W., P. M.,	135	Negative.
	F. W., P. M.,	7	Negative.
10,	R. W., A. M.,	30	Negative.
	F. W., A. M.,	5	Negative.
	R. W., P. M.,	79	Negative.
	F. W., P. M.,	4	Negative.
	Alum decreased to ⅞ of a grain per gallon:		
11,	R. W., A. M.,	65	Negative.
	F. W., A. M.,	12	Negative.
	R. W., P. M.,	88	Negative.
	F. W., P. M.,	18	Negative.
12,	R. W., A. M.,	41	Negative.
	F. W., A. M.,	12	Negative.
	R. W., P. M.,	650	Negative.
	F. W., P. M.,	33	Negative.
14,	R. W., A. M.,	360	Negative.
	F. W., A. M.,	38	Negative.
	R. W., P. M.,	97	Negative.
	F. W., P. M.,	15	Negative.
15,	R. W., A. M.,	160	Negative.
	F. W., A. M.,	23	Negative.
	R. W., P. M.,	42	Negative.
	F. W., P. M.,	9	Negative.
16,	R. W., A. M.,	104	Negative.
	F. W., A. M.,	10	Negative.
17,	R. W., A. M.,	40	Negative.
	F. W., A. M.,	11	Negative.
	R. W., P. M.,	53	Negative.
	F. W., P. M.,	5	Negative.
18,	R. W., A. M.,	145	Negative.
	F. W., A. M.,	10	Negative.
	R. W., P. M.,	133	Negative.
	F. W., P. M.,	4	Negative.
19,	Began using well and low service pump to lift water to filter beds, also began drawing part of supply from Boydstown dam. Alum increased on this date to 1⅓ grains per gallon; use of Boydstown supply discontinued Dec. 23.		
Dec. 21,	R. W., A. M.,	1,730	Positive.
	F. W., A. M.,	82	Negative.
	R. W., A. M.,	1,670	Positive.
	F. W., A. M.,	55	Negative.

Date.		Bacteria.	Coli communis.
22,	R. W., A. M.,	790	Negative.
	F. W., A. M.,	45	Negative.
	R. W., P. M.,	845	Positive.
	F. W., P. M.,	33	Negative.
23,	R. W., A. M.,	1,800	Negative.
	F. W., A. M.,	68	Negative.
	R. W., P. M.,	1,550	Negative.
	F. W., P. M.,	72	Negative.
24,	R. W., P. M.,	1,150	Positive.
	F. W., P. M.,	41	Negative.
26,	R. W., A. M.,	1,830	Positive.
	F. W., A. M.,	85	Negative.
	R. W., P. M.,	1,160	Positive.
	F. W., P. M.,	125	Positive.
27,	R. W., A. M.,	1,210	Negative.
	F. W., A. M.,	63	Negative.
28,	R. W., A. M.,	1,010	Negative.
	F. W., A. M.,	11	Negative.
29,	R. W., A. M.,	1,220	Negative.
	F. W., A. M.,	56	Negative.
	R. W., P. M.,	1,450	Negative.
	F. W., P. M.,	15	Negative.
30,	R. W., A. M.,	865	Negative.
	F. W., A. M.,	15	Negative.
	R. W., P. M.,	870	Negative.
	F. W., P. M.,	6	Negative.
31,	R. W., A. M.,	640	Negative.
	F. W., A. M.,	33	Negative.
	R. W., P. M.,	780	Negative.
	F. W., P. M.,	31	Negative.
Jan. 1,	R. W., A. M.,	2,600	Negative.
	F. W., A. M.,	83	Negative.
2,	R. W., A. M.,	1,350	Negative.
	F. W., A. M.,	14	Negative.
3,	R. W., A. M.,	590	Negative.
	F. W., A. M.,	3	Negative.
4,	R. W., A. M.,	1,720	Negative.
	F. W., A. M.,	5	Negative.
	R. W., P. M.,	2,100	Negative.
	F. W., P. M.,	17	Negative.
5,	R. W., A. M.,	420	Negative.
	F. W., A. M.,	5	Negative.
	R. W., P. M.,	850	Positive.
	F. W., P. M.,	25	Negative.
6,	R. W., A. M.,	550	Negative.
	F. W., A. M.,	5	Negative.
	R. W., P. M.,	580	Negative.
	F. W., P. M.,	8	Negative.
7,	R. W., A. M.,	750	Negative.
	F. W., A. M.,	24	Negative.
	R. W., P. M.,	1,240	Negative.
	F. W., P. M.,	29	Negative.
8,	R. W., A. M.,	1,250	Negative.
	F. W., A. M.,	7	Negative.
	R. W., P. M.,	770	Negative.
	F. W., P. M.,	12	Negative.
9,	R. W., A. M.,	795	Negative.
	F. W., A. M.,	6	Negative.
	R. W., P. M.,	680	Negative.
	F. W., P. M.,	11	Negative.
10,	R. W., A. M.,	970	Negative.
	F. W., A. M.,	15	Negative.
11,	R. W., A. M.,	560	Negative.
	F. W., A. M.,	12	Negative.
	R. W., P. M.,	780	Negative.
	F. W., P. M.,	10	Negative.
12,	R. W., A. M.,	480	Negative.
	F. W., A. M.,	15	Negative.
	Alum decreased to one grain per gallon.		
13,	R. W., A. M.,	450	Negative.
	F. W., A. M.,	6	Negative.
	R. W., P. M.,	380	Negative.
	F. W., P. M.,	2	Negative.
14,	R. W., A. M.,	8,100	Negative.
	F. W., A. M.,	8	Negative.
	R. W., P. M.,	2,700	Negative.
	F. W., P. M.,	1	Negative.
15,	R. W., A. M.,	3,200	Negative.
	F. W., A. M.,	10	Negative.
	R W , P. M.,	1,850	Negative.

Date.		Bacteria.	Coli communis.
	F. W., P. M.,	11	Negative.
16,	R. W., A. M.,	1,640	Negative.
	F. W., A. M.,	7	Negative.
18,	R. W., A. M.,	1,810	Negative.
	F. W., A. M.,	3	Negative.
	R. W., P. M.,	3,200	Negative.
	F. W., P. M.,	15	Negative.
19,	R. W., A. M.,	1,650	Negative.
	F. W., A. M.,	5	Negative.
	R. W., P. M.,	2,120	Negative.
	F. W., P. M.,	22	Negative.
22,	R. W., A. M., 9 o'clock, rain,	34,000	Negative.
	F. W., A. M., 9 o'clock,	120	Negative.
	R. W., noon,	28,000	Negative.
	F. W., noon,	105	Negative.
	R. W., P. M., 3 o'clock,	50,000	Negative.
	F. W., P. M., 3 o'clock,	85	Negative.
23,	R. W., A. M.,	1,500	Negative.
	F. W., A. M.,	38	Negative.

RESULTS OF EXAMINATIONS MADE OF SAMPLES OF WATER TAKEN FROM VARIOUS POINTS IN THE BOROUGH OF BUTLER.

Date.	Location.	Bacteria.	Coli communis.
Dec. 4,	Reservoir,	17	Negative.
	Reservoir,	19	Negative.
5,	Fire hydrant on Pearl street,	9	Negative.
	Fire hydrant on Pearl street,	12	Negative.
	Fire hydrant on Pearl street,	4	Negative.
7,	Faucet in water company's office,	10	Negative.
	Faucet in Red Row,	10	Negative.
8,	Faucet in water company's office,	8	Negative.
	Reservoir,	27	Negative.
	Reservoir,	12	Negative.
9,	Faucet in water company's office,	9	Negative.
	Faucet in water company's office,	9	Negative.
	Faucet in B. & O. Depot,	6	Negative.
10,	Faucet in water company's office,	6	Negative.
11,	Faucet in water company's office,	8	Negative.
	Faucet in private house on Main street,	12	Negative.
12,	Faucet in water company's office, A. M.,	6	Negative.
	Faucet in water company's office, P. M.,	15	Negative.
	Reservoir,	24	Negative.
14,	Faucet in water company's office,	15	Negative.
	Reservoir,	12	Negative.
15,	Faucet in water company's office, A. M.,	18	Negative.
	Faucet in water company's office, P. M.,	11	Negative.
	Faucet in Boyd's drug store,	10	Negative.
	Reservoir,	11	Negative.
16,	Faucet in water company's office,	18	Negative.
	Standard Hotel Hospital,	12	Negative.
	Drug store, Lyndora,	16	Negative.
17,	Faucet in water company's office, A. M.,	4	Negative.
	Faucet in water company's office, P. M.,	14	Negative.
18,	Faucet in water company's office, A. M.,	24	Negative.
	Faucet in water company's office, P. M.,	23	Negative.
21,	Faucet in water company's office, A. M.,	138	Negative.
	Faucet in water company's office, P. M.,	213	Negative.
22,	Faucet in water company's office, A. M.,	32	Negative.
	Faucet in water company's office, P. M.,	45	Negative.
23,	Faucet in water company's office, A. M.,	87	Negative.
	Faucet in water company's office, P. M.,	111	Negative.
24,	Faucet in water company's office, A. M.,	8	Negative.
26,	Faucet in water company's office, P. M.,	63	Negative.
27,	Faucet in water company's office, A. M.,	45	Negative.
29,	Faucet in water company's office, A. M.,	25	Negative.
	Faucet in water company's office, P. M.,	65	Negative.
30,	Faucet in water company's office, A. M.,	66	Negative.
31,	Faucet in water company's office, A. M.,	19	Negative.
Jan. 1,	Faucet in water company's office, A. M.,	56	Negative.
2,	Faucet in water company's office, A. M.,	25	Negative.
4,	Faucet in water company's office, A. M.,	21	Negative.
	Faucet in water company's office, P. M.,	32	Negative.
5,	Faucet in water company's office, A. M.,	28	Negative.
	Faucet in water company's office, P. M.,	15	Negative.
6,	Faucet in water company's office, A. M.,	23	Negative.
	Faucet in water company's office, P. M.,	15	Negative.
7,	Faucet in water company's office, A. M.,	59	Negative.
	Faucet in water company's office, P. M.,	23	Negative.
8,	Faucet in water company's office, A. M.,	78	Negative.
	Faucet in water company's office, P. M.,	27	Negative.
9,	Faucet in water company's office, A. M.,	18	Negative.
	Faucet in water company's office, P. M.,	28	Negative.
11,	Faucet in water company's office, P. M.,	15	Negative.
12,	Faucet in water company's office, A. M.,	28	Negative.
13,	Faucet in water company's office, A. M.,	6	Negative.
14,	Faucet in water company's office, A. M.,	6	Negative.
	Faucet in water company's office, P. M.,	13	Negative.
15,	Faucet in water company's office, A. M.,	13	Negative.
	Faucet in water company's office, P. M.,	10	Negative.
16,	Faucet in water company's office, A. M.,	15	Negative.
18,	Faucet in water company's office, P. M.,	10	Negative.
19,	Faucet in water company's office, A. M.,	12	Negative.
	Faucet in water company's office, P. M.,	34	Negative.
22.	Faucet in water company's office, A. M.,	54	Negative.
23,	Faucet in water company's office, A. M.,	34	Negative.

It will be noticed from the results of these examinations that of the 77 examinations made of the raw water taken from the surface of the filters that 7 samples showed the presence of Bacillus Coli Communis, and that 78 examinations made of the filtered water taken from a trap connected with the reservoir supply, but one sample showed the presence of B. Coli communis. No evidence of pollution was found in the raw water until December 21, at which time the total bacteria showed a great increase in numbers. As it had become necessary on December 19 to draw a portion of the supply from the Boydstown reservoir, and in consequence, to use the receiving well, it was thought possible that the latter might have contributed to the finding of an increased number of bacteria, and also account for the presence of B. Coli Communis. Although this well had been thoroughly flushed for four days prior to its use, it was possible to discontinue this use, on December 23, as the supply of water in the Thorn Run reservoir had been replenished by melted snow water. In this connection it is important to consider that snow had fallen at intervals from December 1st until the 20th, and a moderately uniform low temperature had been maintained during this period. The fact that the bacteria continued to be present in the same relative proportion after the discontinuance of the use of the Boydstown water and the receiving well would seem to indicate that their presence was due to the melting snow and foreign material which found its way through this medium to the reservoir. This belief is further strengthened by the fact that the receiving well was emptied and examinations made of the water at three stages in the process of emptying, with the following results:

Sample No. 1, 1,500 bacteria, B. Coli Communis negative. Sample No. 2, 2,100 bacteria, B. Coli Communis negative. Sample No. 3, 528 bacteria, B. Coli Communis negative. The walls of the receiving well were built of brick, laid in cement, the bottom was covered with two inch planking. It was found that water was flowing in considerable quantity into the well, through the spaces between the bottom planking. This flow continued until the water in the well reached a depth of about two feet, when it apparently ceased. An examination of this water showed it to contain a total of 43 bacteria with B. Coli Communis absent. Its strong alkalinity favored the view that it was water which came from abandoned salt wells, a number of which had existed some years previous within a short distance of its location. Although the examination of this water showed it to be of harmless character, yet the water company took immediate steps to prevent its further entrance into the well by introducing a new bottom composed of concrete one foot in thickness.

The results of the 74 analyses made of samples of water taken from faucets in various parts of the town from December 4th to January 3d, all of which show an absence of B. Coli Communis and the relative low amount of other bacteria would indicate that the process of filtration was being performed with a high rate of efficiency and that nothing was to be feared from the supply as it existed during this period. In addition to the examinations made of the water as supplied by the Butler Water Company, examinations were made of the supply furnished by the Butler Mutual Water Association with the following results:

Springdale well No. 1, 80 bacteria B. Coli Communis negative.

Springdale well No. 2, 37 bacteria B. Coli Communis negative.

Springdale well No. 3, 450 bacteria B. Coli Communis negative.

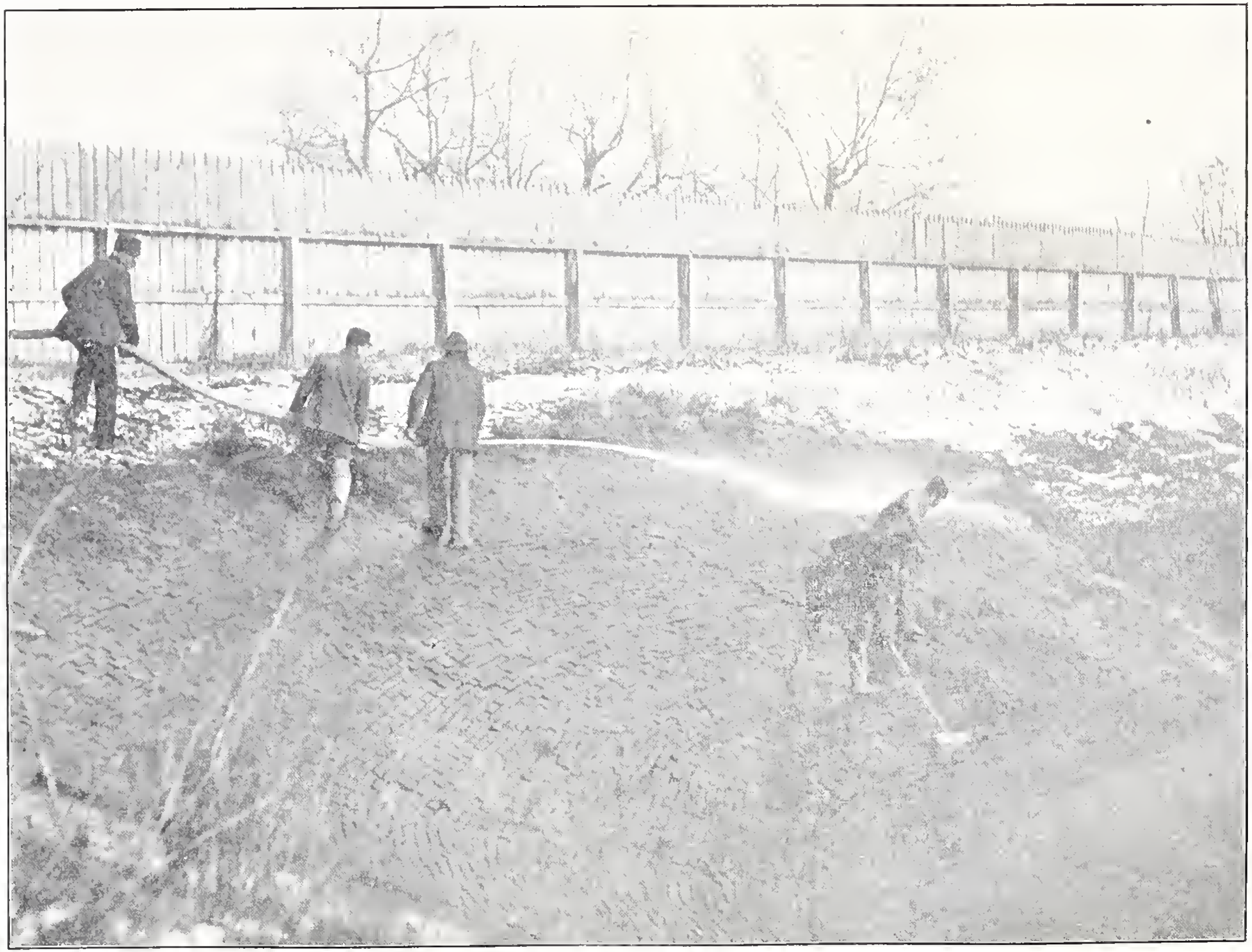
Springdale well No. 3, second sample 2 bacteria B. Coli Communis negative.

The disparity in the results of the examinations of the two samples from Springdale well No. 3 would indicate that due care had not been taken in sterilizing the bottle in which it had been collected, or in handling the same.

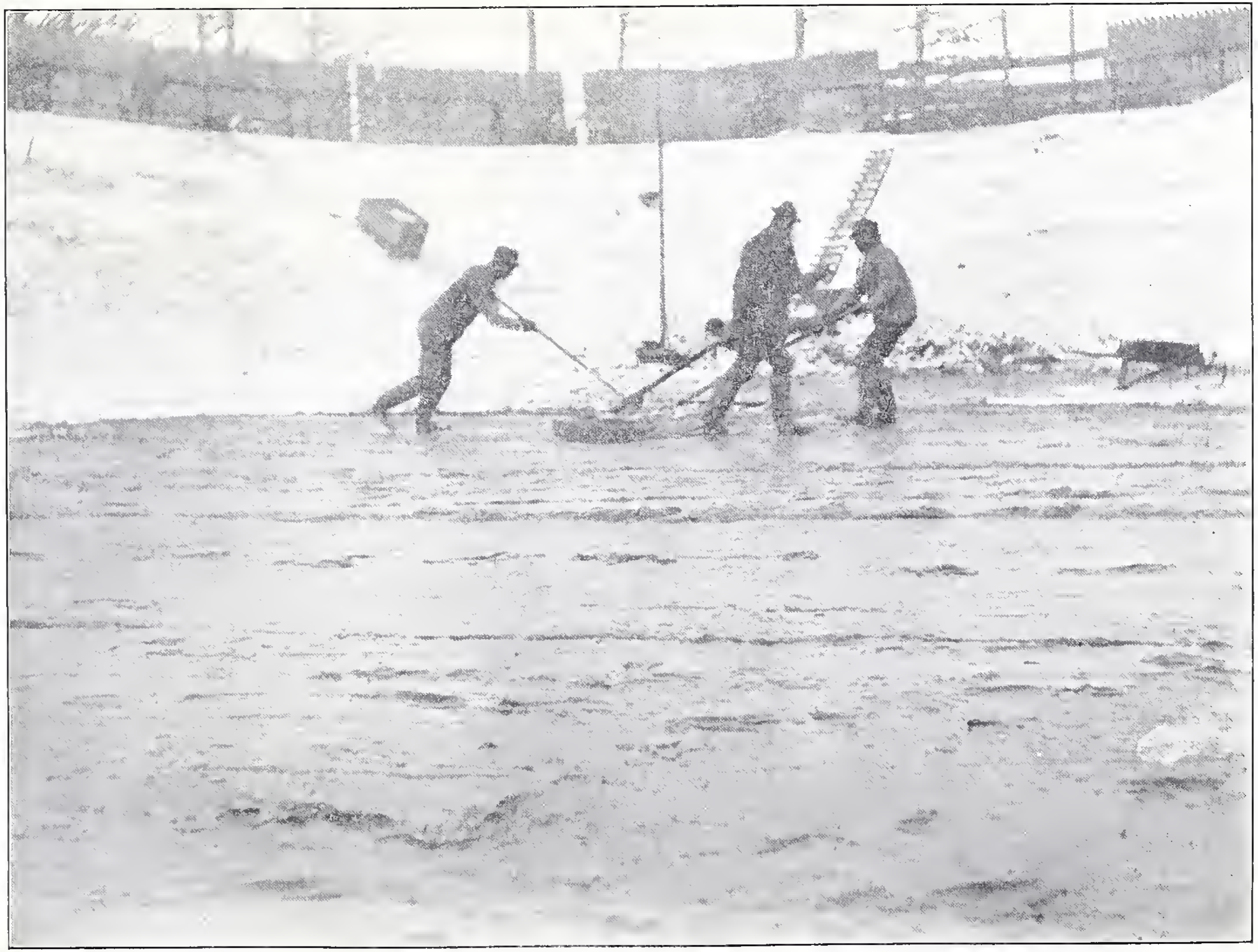
As many private wells are in use throughout the borough, examinations of samples of water taken from 66 of these are given as follows:

Location.	Bacteria.	Coli communis.
318 Third street,	280	Negative.
303 Third street,	24	Negative.
201 Third street,	450	Negative.
301 Third street,	10	Negative.
401 Third street,	6	Negative.
315 Third street,	36	Negative.
322 Third street,	17	Negative.
233 Third street,	46	Negative.
304 Third street,	4	Negative.
323 Third street,	5	Negative.
237 Third street,	1	Negative.
223 Third street,	4	Negative.
228 Third street,	1,560	Negative.
182 Elm street,	23	Negative.
205 Elm street,	3	Negative.
206 Elm street,	36	Negative.
319 Second street,	21	Negative.
German Catholic school,	20	Negative.
810 East Jefferson street,	5	Negative.
314 East Jefferson street,	580	Negative.
Corner Third and Carbon streets,	5	Negative.
144 Brady street,	26	Negative.
416 North McKean street,	25	Negative.
430 North McKean street,	1,360	Negative.
600 North McKean street,	28	Negative.
405 North McKean street,	5	Negative.
340 North McKean street,	2	Negative.
509 North McKean street,	4	Negative.
436 North McKean street,	3,200	Negative.
415 North McKean street,	1,520	Negative.
446 North McKean street,	380	Negative.
120 West North street,	3	Negative.
Corner of Clay and McKean streets,	2	Negative.
214 North Main street,	7	Negative.
350 North Main street,	17	Negative.
300 North Main street,	1,500	Negative.
134 West North street,	3	Negative.
Corner of Clay and Walker streets,	950	Negative.
Corner of North Main and West Penn streets,	9	Negative.
227 North Washington street,	5	Negative.
304 North Washington street,	1,200	Negative.
228 Fulton street,	24	Negative.
328 North Washington street,	16	Negative.
207 Franklin street,	13	Negative.
Park Spring, below pavillion,	3	Negative.
Park stream, above station,	1,520	Negative.
304 North Washington street,	650	Negative.
407 Third street,	30	Negative.
321 Locust street,	3	Negative.
427 North McKean street,	15	Negative.
433 North McKean street,	650	Negative.
306 Locust street,	10	Negative.
228 Third street,	12	Negative.
Shuffelin well,	40	Negative.
319 East Park,	6	Negative.
301 Cecelia street,	11	Negative.
241 Jefferson street,	131	Negative.
No. 1 well, near office, Standard Car Company,	5	Negative.
No. 2 well, centre of yard, Standard Car Company,	8	Negative.
No. 3 well, 600 feet deep, Standard Car Company,	3	Negative.
No. 4 well, in shop, Standard Car Company,	11	Negative.
508 North McKean street,	9	Negative.
Wersingers,	27	Negative.
German Lutheran church,	2	Negative.
Pennsylvania hotel,	8	Negative.
B., R. & P. shop restaurant,	11	Negative.

The large number of bacteria shown in many of these examinations was found upon investigation to be the result of surface water reaching the well through imperfect casings, or lack of elevation in well platform.



View of men scrubbing sides of reservoir.



View showing men drawing mud on bottom of reservoir to outlet pipe.

FLUSHING OF PIPES AND CLEANING OF RESERVOIR.

On November 18, at the suggestion of the local Board of Health, the Water Company began the flushing of the pipes by opening the fire hydrants. This work was continued at intervals and by December 2 the principal mains had been repeatedly flushed, by this method.

On December 5, a reflushing was commenced which was intended to include every individual service pipe as well as the fire hydrants. This was accomplished by dividing the borough into districts and personally notifying the residents to open every faucet on their premises at a certain hour, and at the same hours mentioned, men were stationed at the fire hydrants in this district to open the same. The length of time required to accomplish this flushing was considerably longer than would have been ordinarily necessary, owing to the fact that the daily consumption of water was practically equal to the pumping capacity, and that it was deemed unsafe to exhaust the supply of water in the reservoir below a certain point, as otherwise the town would have been left without adequate protection in case of fire. The entire work was accomplished, however, in about ten days. The connections for the new pump were received and placed in position on the 15th of December, and on the 18th the pump was available for service. On the 20th the work of draining and cleaning the reservoir was commenced and by continuing the same day and night this was completed on the 23d. The bottom of the reservoir was found to contain from six to twelve inches of sediment. The sides and bottom were thoroughly scrubbed with brushes and hose, and the entire reservoir was made perfectly clean. Examinations made of samples of water taken at various stages in the process of cleaning gave the following results:

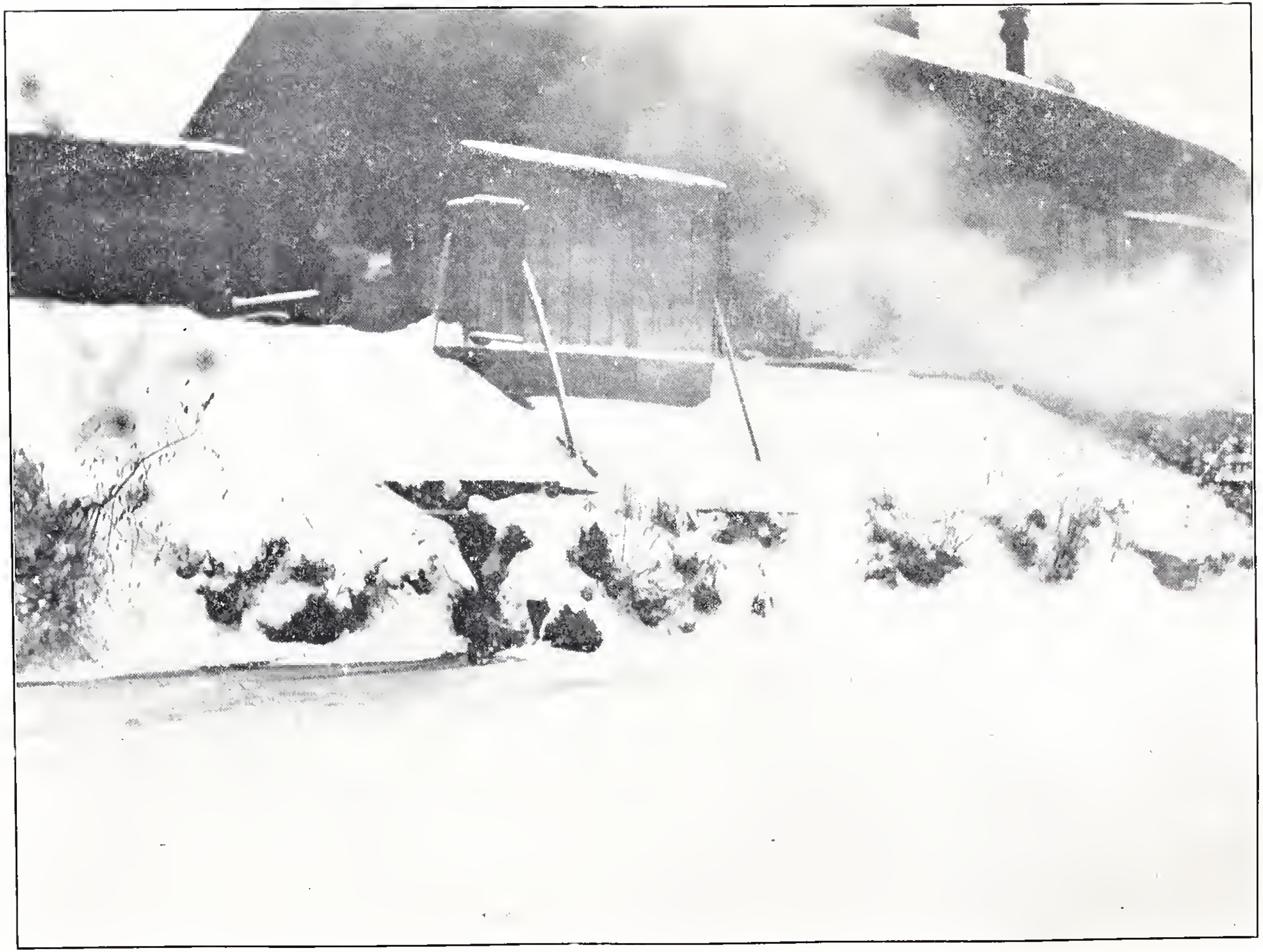
No. 1. 37 bacteria, B. Coli Communis absent.
No. 2, 480 bacteria ,B. Coli Communis absent.
No. 3, 1,350 bacteria, B. Coli Communis absent.
No. 4, 720 bacteria, B. Coli Communis absent.

The reservoir was immediately refilled with the filtered water and the work of reflushing the entire town was commenced in the same manner as had been employed previously. The extreme cold weather which prevailed throughout this locality for several weeks interfered very much with the progress of this work, the thermometer at periods registering 28 below zero, and the opportunity was afforded only on occasional days, of accomplishing the work. On this account the entire reflushing was not completed until January 19, 1904.

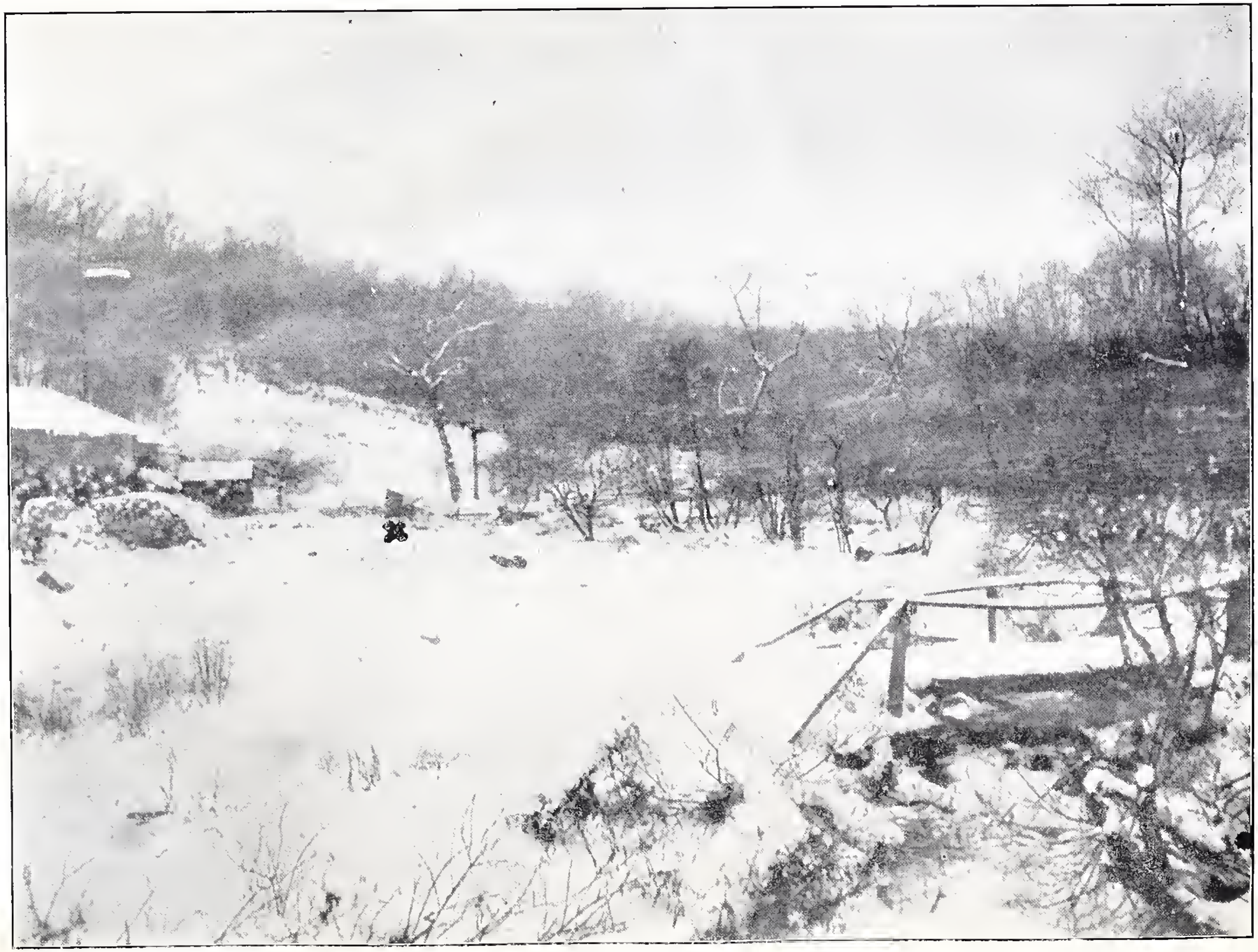
Samples of water were collected from various points in the borough on January 20th and 21st, and examined bacteriologically with the following results:

Location.	Bacteria.	Coli communis.
Broad Street school,	4	Negative.
318 Ziegler avenue,	7	Negative.
Williard hotel,	6	Negative.
104 New Castle street,	7	Negative.
223 Lincoln avenue,	17	Negative.
Richey's South Main street,	11	Negative.
Baltimore and Ohio passenger depot,	9	Negative.
537 North Main street,	12	Negative.
Fulton and McKean streets,	4	Negative.
West Diamond street,	17	Negative.
300 North Washington street,	25	Negative.
329 West Pearl street,	8	Negative.
215 East Clay street,	10	Negative.
315 Centre avenue,	10	Negative.
Butler rolling mills,	8	Negative.
315 Elm street,	27	Negative.
Pennsylvania depot,	41	Negative.
413 Locust street,	45	Negative.
Water company's office,	21	Negative.
Boyd's drug store,	28	Negative.
200 Brady street,	10	Negative.
Standard hospital,	6	Negative.
Bessemer street, Lyndora,	5	Negative.
402 Carbon street,	6	Negative.
Drug store, Lyndora,	4	Negative.
137 Brady street,	12	Negative.
Water company's office,	3	Negative.

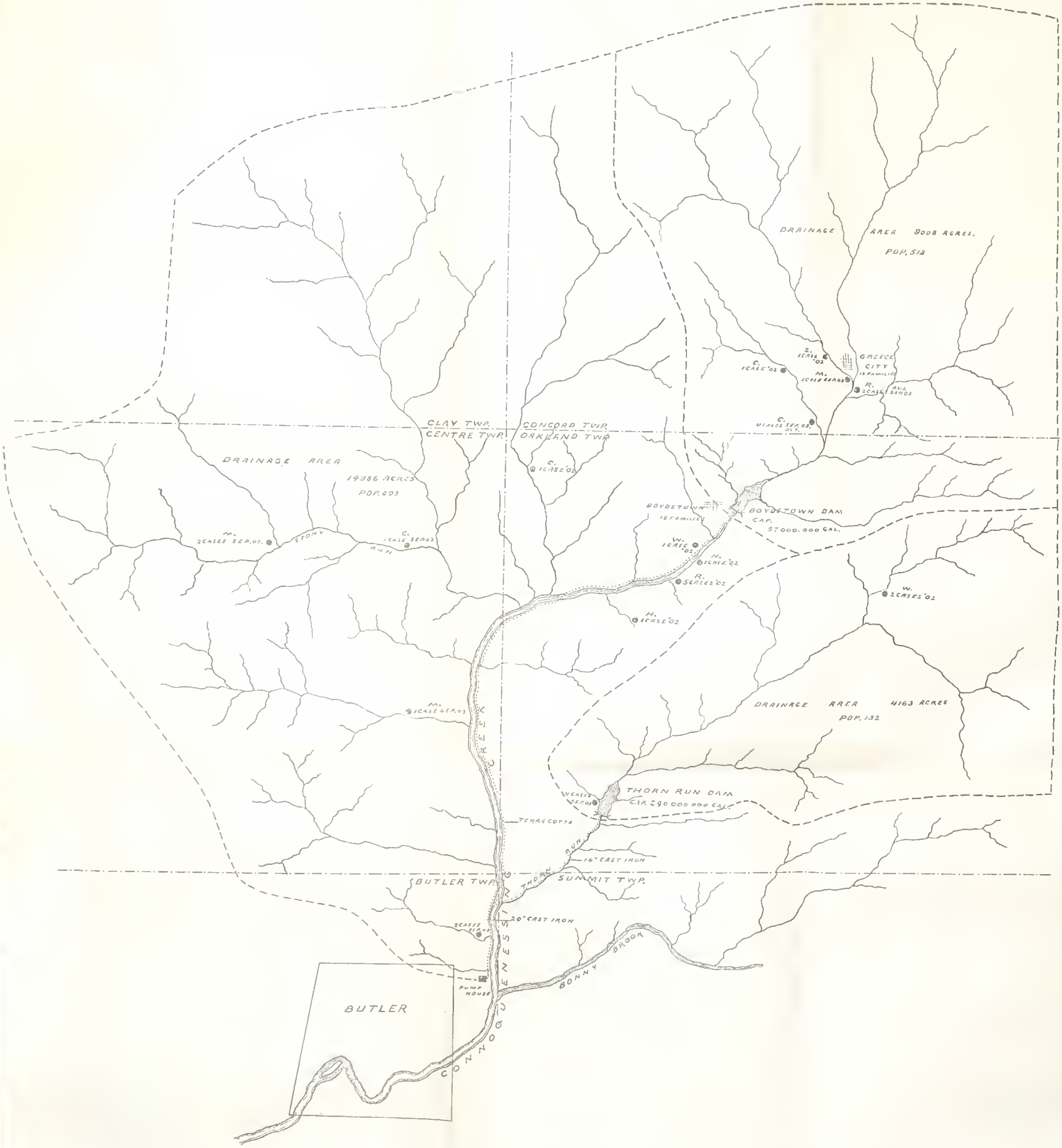
It is evident that the cleansing of the reservoir and the flushing of the mains was not without good results, as the average number of bacteria for the ten days previous to the reflushing as shown by the analyses made of samples collected at the office of the water company was 20, while the average of the 27 samples given above was 12.5.



View of privy at the B. R. & P. R. R. round-house, showing connection with Connoquenessing creek less than one thousand feet from intake at pumping station and used daily by about seventy men.



View on Brook No. 2 showing location of privy directly on edge of stream used by employes of brick works.



Reduced Map of Drainage Area of the Connoquenessing Creek, Showing Location of Typhoid Cases, Without Names.

INVESTIGATION OF THE WATER SHEDS OF THE CONNOQUENESSING CREEK, BOYDSTOWN AND THORN RUN RESERVOIRS.

As has been previously stated the water supply of the Butler Water Company from October 20 to November 2 was derived from the Connoquenessing creek through an emergency intake at the pumping station, and during this period was unfiltered. An investigation of the character of this water therefore, becomes of the greatest importance in determining all possible sources of pollution. As neither the Boydstown reservoir nor the Thorn Run reservoir were completed between the dates mentioned, the flow from these water sheds was uninterrupted, and in considering the possible sources of pollution the entire drainage area of the Connoquenessing may be included as contributing to the supply at this time. The head waters of the Connoquenessing creek are located in Concord township, from which point the stream flows south west through Oakland, Centre and Butler townships, receiving en route the waters of Stony Run, Thorn Run and numerous small tributaries. The water shed comprises 28,217 acres, is sparsely settled at the rate of about 24 persons per square mile. The surface is broken and hilly and the run-off of storm water very rapid. Near the head waters is located Greece City, which at the present time consists of twelve families. In the period between 1882 and 1884 Greece City was a prosperous town of from 2,000 to 4,000 inhabitants. The era of its greatest growth being coincident with the discovery and development of oil fields in its immediate vicinity. Upon the exhaustion of this field, its decline was as rapid as its rise, and to-day but little remains to indicate its former prosperity.

Boydstown, the only other village in this drainage area is located on the Connoquenessing creek, just below the site of the Boydstown reservoir, and contains 16 families.

The result of the investigation of this entire water shed showed that not only had typhoid fever existed at various points within its boundaries since 1900, but that in 1902 the unusual number of 14 cases had occurred and in 1903 17 cases had existed coincidently in the months of September and October. Three of these cases had fatal terminations. The cases occurring in 1903 were divided among eight families, and their locations in reference to the water courses are shown on the accompanying map. Two of the cases occurred within 1,500 feet of the intake at the pumping station, and the most remote case was seven miles distant. The probable source of infection in the cases in close proximity to the pumping station was a well within 200 feet of the house and partially underlying the tracks of the Pittsburg, Bessemer and Lake Erie Railroad. (See map.) An examination made of water taken from this well on December 8th and 10th resulted as follows:·

Sample No. 1. December 8, 23 bacteria B. Coli Communis present.

Sample No. 2. December 10, 61 bacteria B. Coli Communis present.

The pump at this well was immediately dismantled. The earth closet into which the discharges from the patients at this locality were deposited is situated about 150 feet from a brook, and at an elevation of eight feet above the water level. No positive information could be gathered concerning any effort to disinfect the discharges. The source of infection in the four cases existing in September in close proximity to the Thorn Run reservoir originated in the person of a visitor from a distant section of the State who was taken ill within a few days of her arrival in this home. The order in which the cases occurred is as follows: August 1, September 5, September 29, and October 25. Convalescence in each case had been prolonged and on December 5, the two later cases were still bed-ridden. The house was located directly on the west slope of the reservoir, about 450 feet from the water line. The earth closet was in poor condition and the surrounding ground showed evidence of having received slops and waste.

It was the discovery of these cases on November 7 by the local Board of Health that suggested to them the possibility of their having contributed to the pollution of the water supply. An intercepting ditch had been dug by employes of the Water Company under their direction along the brow of the hill to a point which would carry surface drainage from this house into Thorn Run below the reservoir. At the same time they had disinfected the contents of the earth closet and provided a new closet to the south of the buildings in a locality in which there would be less opportunity for direct surface drainage to the reservoir. A bacteriological examination of the water impounded in Thorn Run reservoir and its immediate tributaries was made with the following results:

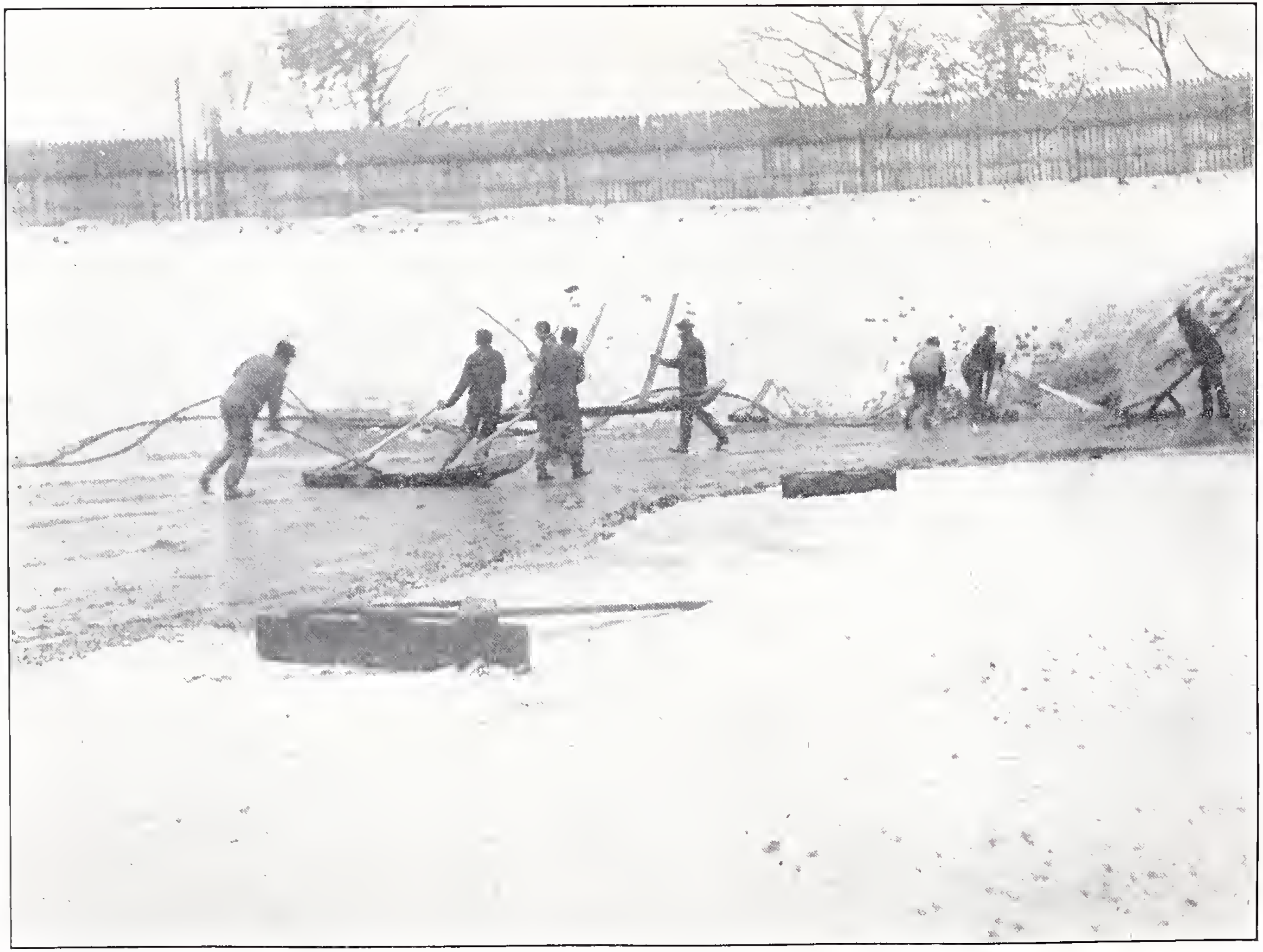
From West Brook, 85 bacteria, B. Coli Communis absent.

From East Brook, 45 bacteria, B. Coli Communis absent.

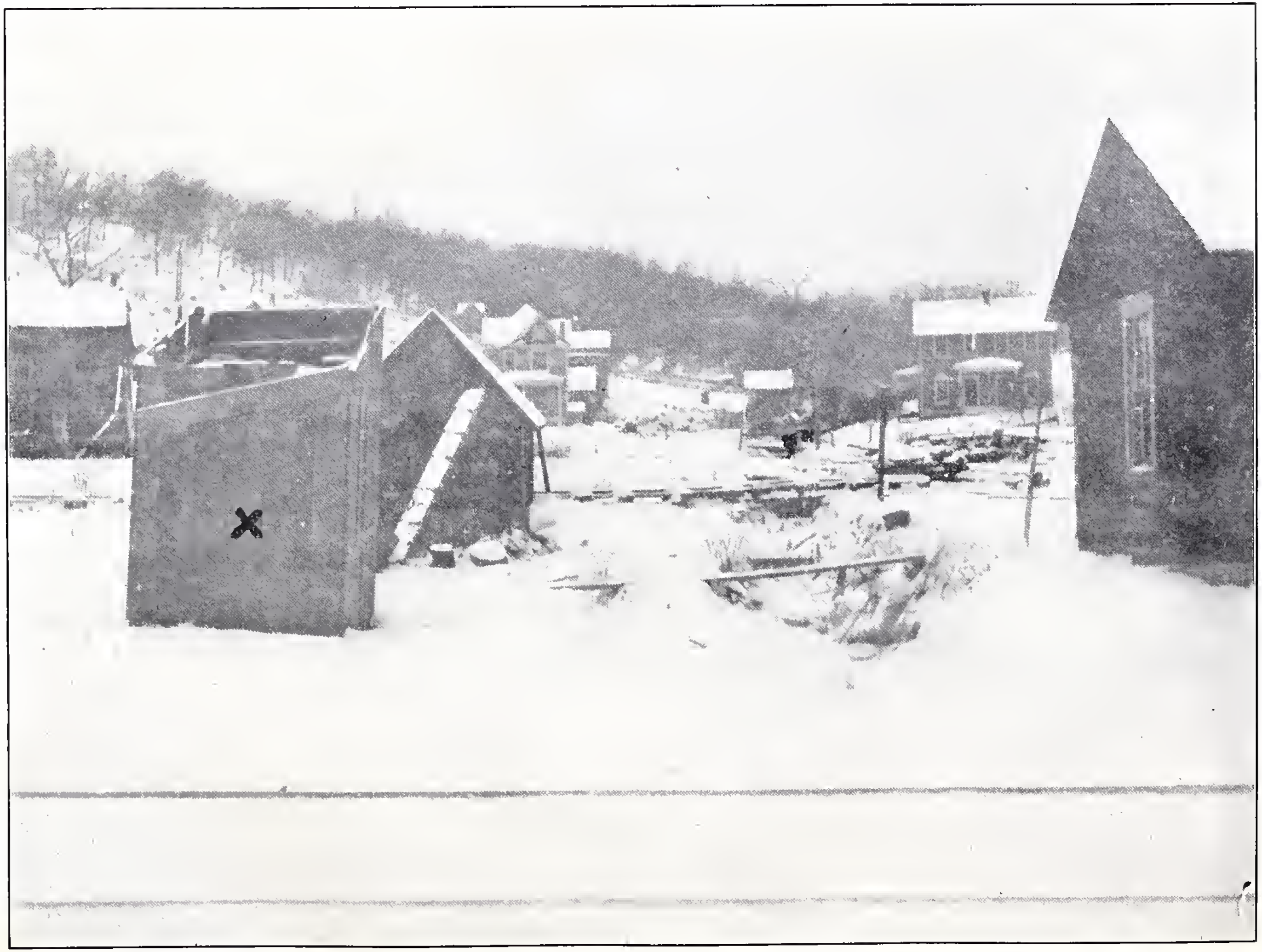
From reservoir near outlet gate, 48 bacteria, B. Coli Communis absent.

From Sofers spring, 106 bacteria, B. Coli Communis absent.

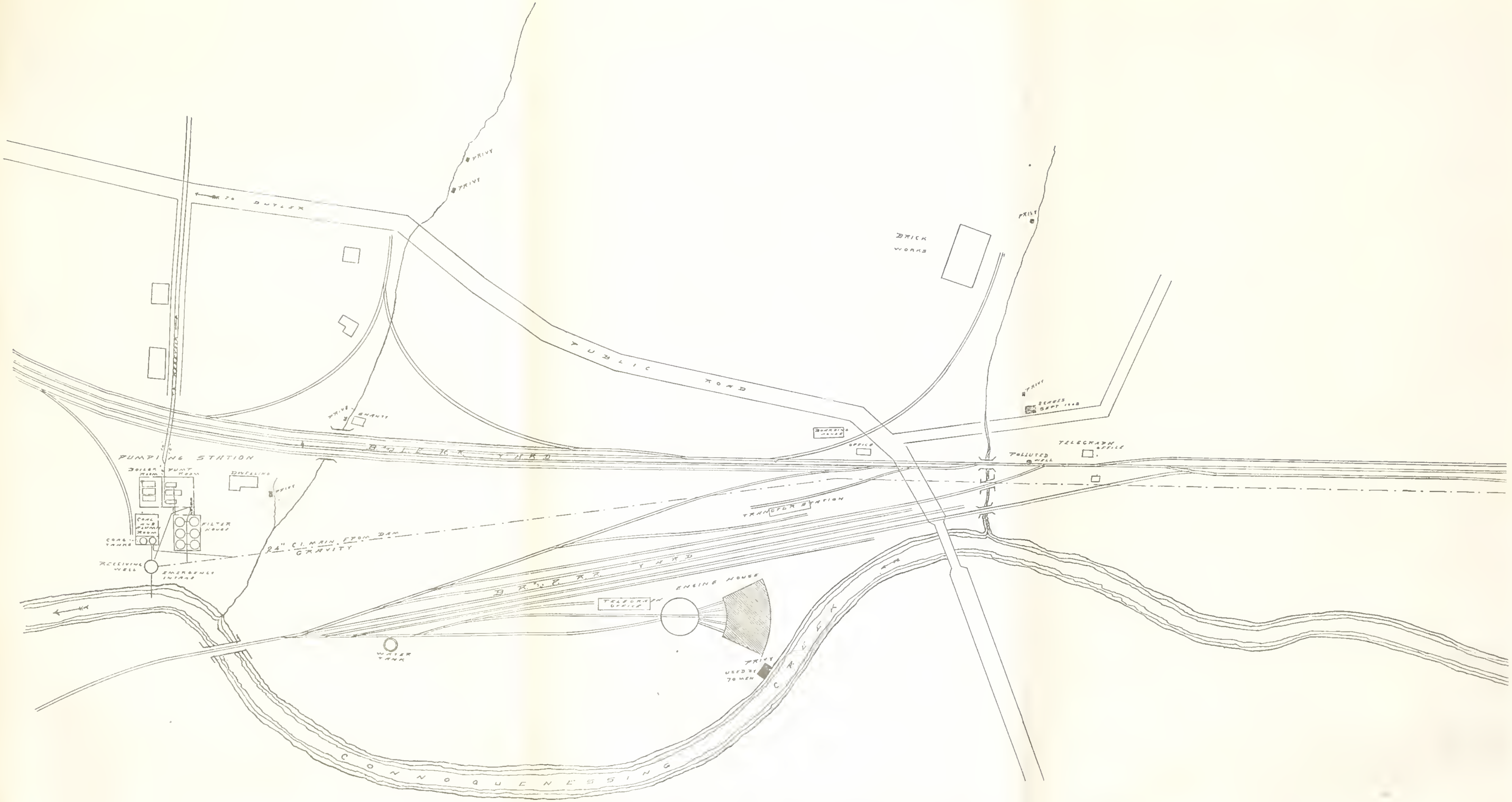
An investigation of the circumstances surrounding the remaining eleven cases which occurred in the water shed of the Connoquenessing Creek in September and October, 1903, showed that in every case the nursing had been performed by some member of the family. In the case of four of the patients it was testified by the members of the family that the discharges from the patient had been buried



View showing method of washing mud on bottom of reservoir through outlet pipe.



View on Brook No. 1 showing privy used by railroad laborers, also other privies directly on edge of brook which empties into creek less than 100 feet from intake at pumping station.



Plan of Locality Surrounding Pumping Station at Butler, Showing Points of Pollution of Water.

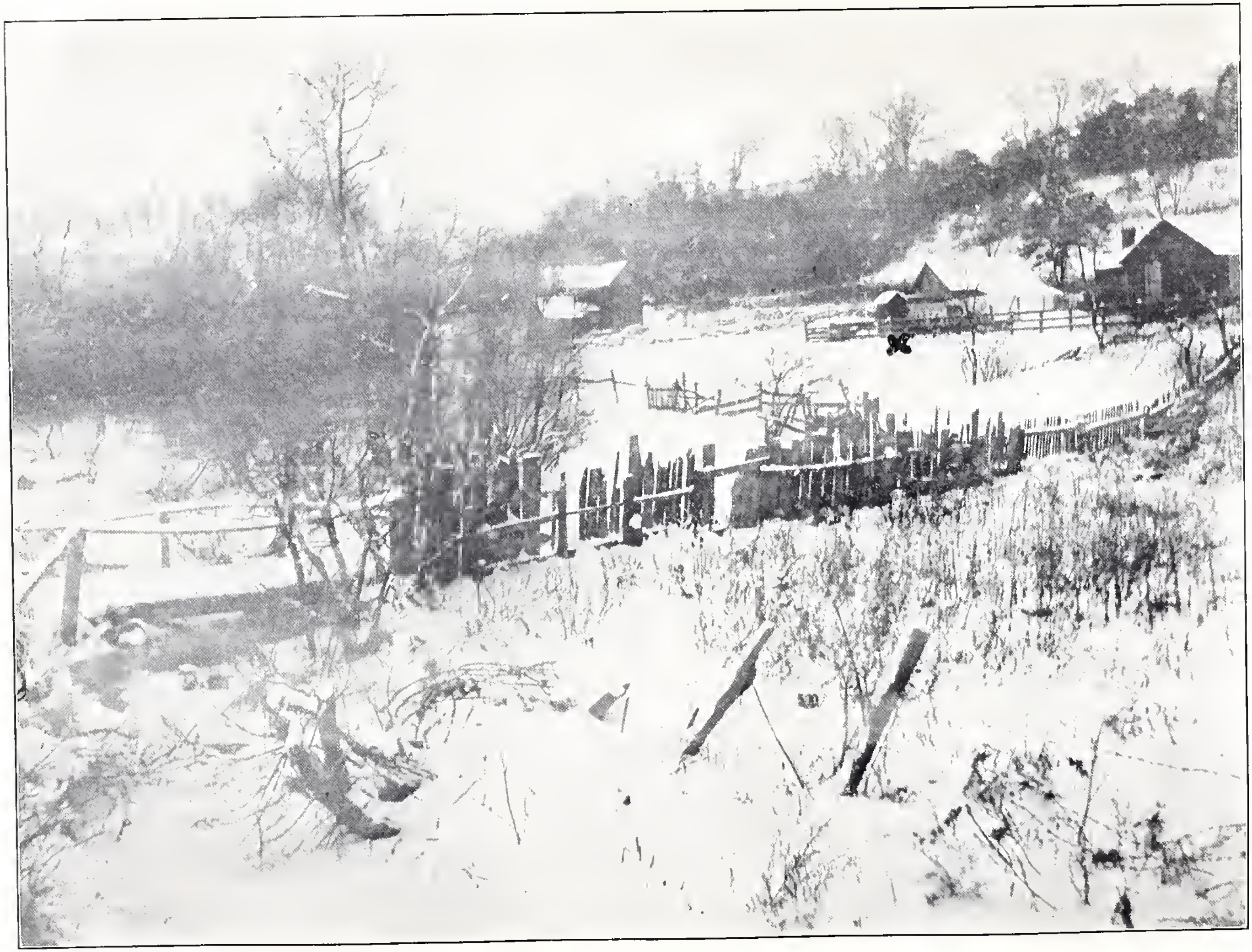
in the ground, in the balance of the cases the discharges had been deposited in earth closets whose distances from the nearest run varied from 20 feet to 250 feet. Inquiry elicited very meagre information concerning the use of disinfectants in any of the cases. The location of all of the earth closets suggested the possibility, in event of a decided rainfall, of their contents immediately reaching some of the smaller runs, tributary to the Connoquenessing, either by direct overflow or percolation, and in event of slops and waste being thrown directly on the surface of the ground this possibility would become a practical certainty.

It is interesting to note in this connection that slight rainfalls occurred during the first week of October, 1903, and that the heaviest rainfall of the month occurred on the 22d and 23d. In addition to the possible sources of pollution from cases of typhoid which have been described, numerous other opportunities for contamination were discovered throughout the entire water shed; the most striking of which were found to exist in close proximity to the pumping station, and are shown on the accompanying map, of this locality. The most serious instance probably being the location of a privy directly overhanging the banks of the stream near the B. R. & P. round-house, and within one thousand feet of the intake which was and is constantly used by seventy men, principally train crews. Along brook No. 1 were found to exist numerous privies in close proximity to the stream, and one instance as shown by the accompanying photograph a privy used by itinerant railroad laborers to the number of eighteen or twenty.

On brook No. 2, as shown by a photograph of the locality, the privy used by the employes of the brick works was found to be directly on the banks of the stream. Having shown the numerous opportunities which existed for the pollution of the waters of the Connoquessing, bacteriological examinations of this water became of the greatest interest. The results of the examinations shown herewith demonstrate that the waters of this creek furnished evidence of a relatively constant pollution inasmuch as 60 per cent. of the examinations made between December 8, 1903, and January 23, 1904, showed the presence of B. Coli Communis. It is also worthy of note that during the periods when B. Coli Communis were absent, an extreme low temperature prevailed which prevented in a large degree ordinary surface drainage.

RESULTS OF EXAMINATIONS MADE OF SAMPLES OF WATER TAKEN FROM THE CONNOQUENESSING CREEK AT PUMP STATION.

Date.	Bacteria.	Coli communis.
December 8,	145	Positive.
December 10,	94	Positive.
December 11,	78	Negative.
December 12,	210	Positive.
December 14,	208	Positive.
December 15,	30,000	Positive.
December 16,	18,000	Positive.
December 17,	360	Positive.
December 18,	360	Positive.
December 21,	1,310	Positive.
December 22,	920	Positive.
December 23,	780	Positive.
December 24,	920	Negative.
December 26,	21,000	Positive.
December 28,	1,860	Positive.
December 29,	3,200	Positive.
December 30,	1,430	Negative.
December 31,	1,210	Positive.
January 1,	680	Negative.
January 2,	540	Positive.
January 3,	1,200	Positive.
January 4,	750	Positive.
January 5,	675	Positive.
January 6,	350	Negative.
January 7,	650	Negative.
January 8,	580	Negative.
January 9,	1,050	Positive.
January 10,	1,010	Negative.
January 11,	950	Negative.
January 12,	780	Negative.
January 13,	1,510	Negative.
January 14,	1,450	Negative.
January 15,	1,320	Negative.
January 16,	2,140	Positive.
January 18,	1,250	Negative.
January 19,	1,250	Negative.
January 22 (thaw and rain),	120,000	Positive.
January 23,	18,500	Positive.



View on Brook No. 2, showing location of privy receiving discharges from two cases of typhoid fever in September, 1903. This brook empties into the Connoquenessing creek 1,500 feet from intake at pumping station.

INVESTIGATION OF THE MILK SUPPLY OF THE BOROUGH OF BUTLER.

An examination of the milk supply of Butler was commenced on December 4 for the purpose of ascertaining whether typhoid fever existed in the families of dairymen or milk-men, and to remove if possible any causes which might contribute to the spread of infection from such cases. It was found that the citizens of Butler were supplied with milk by 23 independent dealers, two of whom supply nearly one-half of the total milk consumed. At the date of commencing the investigation it was found that no cases of typhoid fever existed among the families or employes of the milk dealers. At a later stage of the epidemic two cases of typhoid fever developed in a family having a small milk depot. These cases immediately following their diagnosis were removed to hospitals and detained there until convalescence was completed. An inquiry into the methods of sterilizing bottles and vessels used in the delivery of milk to private families was made, with the discovery that with one or two exceptions this could be only imperfectly performed. In view of the fact that the bottles in which milk was being delivered were frequently carried to the sick room and patients permitted to drink from the same, it was decided to prohibit absolutely the delivery of milk in such receptacles, and to prohibit the removal of vessels of any descripton from the houses of customers. In accordance with this decision all dealers were served with the following notice, and the same was published in the daily papers of the borough.

"You are hereby directed that after Sunday, December 6, 1903, the delivery of all milk by you must be made under the following conditions:

The consumer must furnish a receptacle for the milk, and absolutely no bottles or cans which have been in private houses, restaurants or hotels shall be received and taken away by you under any circumstances.

Dealers in milk may receive milk in cans or bottles from their shippers but must cleanse and disinfect these receptacles before returning them to the shipper.

This order remains in force until further notice."

Personal inquiry and observation showed that this order had been cheerfully and strictly obeyed.

The claim of pasteurization made by several of the local milk dealers was found to be not justified by an investigation of the methods which they employed. Under the direction of the inspector of the State Board the temperature was ordered to be raised to a point which would justify the declaration of perfect pasteurization. Twenty-one independent dairies within a radius of six miles of Butler were visited and the conditions under which the milk was produced and handled thoroughly investigated. No typhoid fever was found in the families or among the employes of any of these producers. The sanitation of the stables was found to be above the average; the stock well cared for and the milking done in a fairly commendable way.

AN INVESTIGATION OF THE SANITARY CONDITIONS EXISTING IN INFECTED HOUSES, THE DISTRIBUTION OF DISINFECTANTS AND INSTRUCTIONS IN REGARD TO THEIR USE IN ORDER TO PREVENT CASES OF SECONDARY INFECTION.

On December 4 the following notification was published in the daily papers and 5,000 hand-bills were printed for distribution:

IMPORTANT.

All Persons are Cautioned to use no Water for Domestic Purposes Until the Same has been Carefully Boiled.

Nurses and attendants upon those who may be ill with typhoid fever are required to pay particular attention to the disinfection of all discharges from the patients, and all soiled linen by the following methods:

All discharges from patients must be received in vessels containing a solution (1 to 2,000) of Bi-Chloride of mercury (tablets for preparing this solution will be provided gratuitously by the State Board of Health). An equal volume of this solution should be added before disposing of the discharges in closets or privy vaults.

All soiled linen must be immediately immersed in a solution of Bi-Chloride of Mercury (1 to 2,000) for at least two hours, after which it should be boiled for the same length of time. Any bedding unsuitable for such disinfection must be burned.

Tubs or other suitable vessels containing the disinfecting solution should be in readiness at all times.

Attendants and nurses are cautioned against using the drinking vessels or the tableware used by the patients. Provision should be made for the exclusive use in the sick room, of the necessary articles, and these should be frequently cleansed.

Thorough disinfection of the hands of the attendants should be performed at frequent intervals, using the solution of mercury mentioned above.

Closets or sinks receiving slops or waste water used in connection with the patient should be flushed daily with water containing the requisite amount of carbolic acid as indicated on the packages distributed by the State Board of Health.

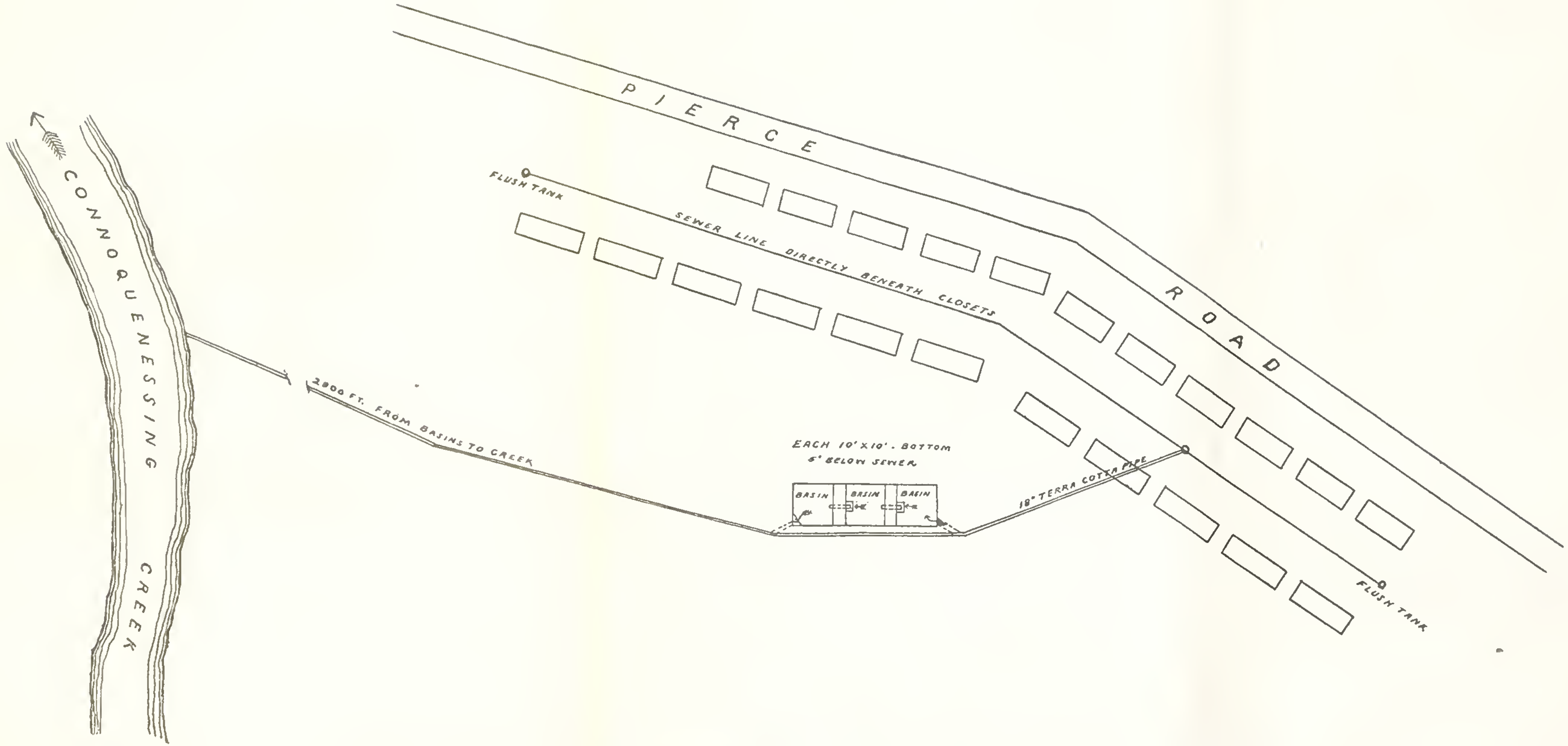
Failure to observe these precautions may result in the infection of those who are by necessity forced to be in close contact with typhoid fever patients.

The above regulations are submitted by the STATE BOARD OF HEALTH, and strict compliance with the same is required.

At the same time the distribution of disinfectants to the individual houses was commenced. The disinfectants used were those mentioned in the circular, viz: Bi-Chloride of Mercury in the form of tablets containing seven and one-half grains of the former with sufficient amount of tartaric acid to make an alkaline solution, and blue vegetable coloring matter to give a distinctive color to the same. These were distributed in packages containing twenty-five and fifty tablets, and labeled with careful instructions as to their use. Carbolic acid was distributed in pound packages with proper directions for using the same. The distribution of these disinfectants was supplemented by a house to house inspection to determine the general sanitary condition and was further followed by the visitation of graduate nurses who gave careful instructions in the preparation of the disinfectant solutions, and a practical demonstration in their uses, at the same time pointing out to those having charge of the patients the various possible paths of infection from typhoid.

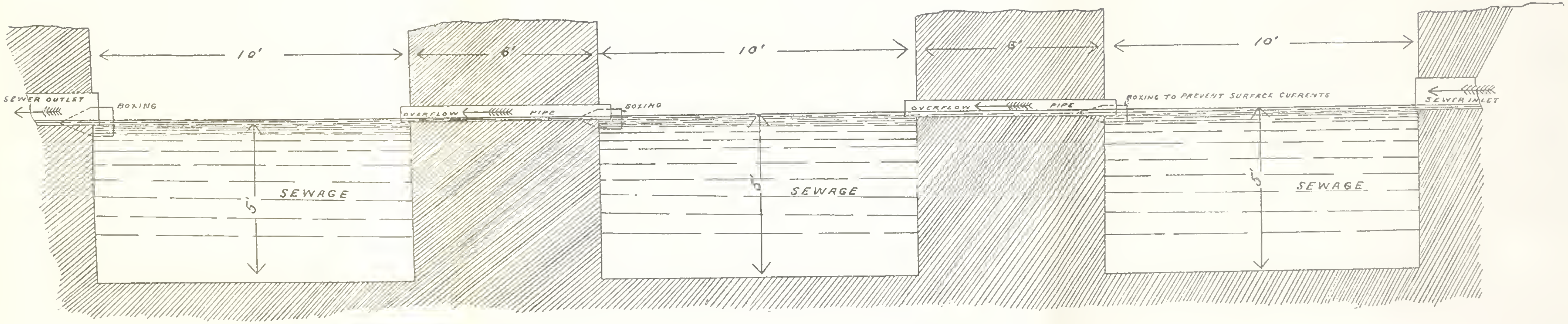
This work was considered absolutely essential in order to prevent cases of secondary infection, and was productive of excellent results. The opportunity was taken during the progress of house to house visitation to secure accurate data as to the names, ages and date of beginning of illness of each individual case, and it is from these reports that the data of the epidemic are compiled. A total of 826 houses were infected. Disinfectants were distributed to this entire number twice, and to at least one-half, three times, and distribution was made at headquarters daily from 9 A. M. to 10 P. M. for those who would apply for the same. A total of 2,600 packages of Bi-Chloride tablets and 2,450 packages of carbolic acid were gratuitously supplied.

In addition to the above work, seven school buildings containing 79 rooms, halls and basements, were fumigated with formaldehyde gas. Also 34 rooms and basement in Standard Hospital, 7 rooms and basement in Lyndora Hospital, postoffice and contents, and 950 school books. Twenty basements in private houses and 168 privies were also disinfected.

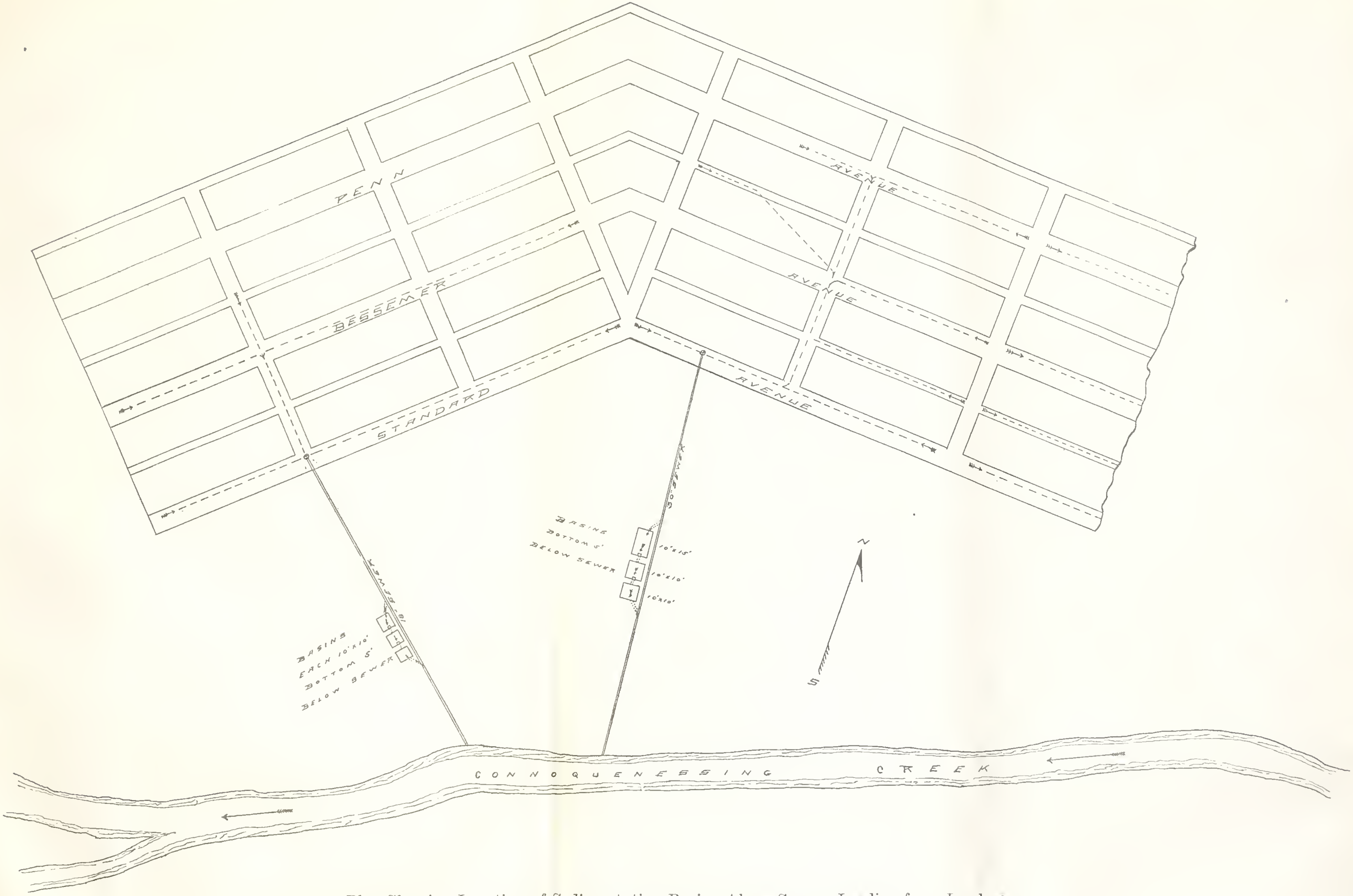


Plan Showing Location of Sedimentation Basins Along Sewer Leading from "Red Row."

Failure to observe these precautions may result in the infection of



Sectional View of Sedimentation Basins for Collection of Sewage.



Plan Showing Location of Sedimentation Basins Along Sewers Leading from Lyndora.

TREATMENT OF SEWAGE IN BULK.

The concentration of the foreign population of Butler in what is known as the "Red Row" and "Lyndora" districts, with independent sewer lines from these localities direct to the creek, made it possible to treat the sewage from these districts in bulk. Seventy-five cases of illness developed in these districts, particularly among those people incapable of understanding either the necessity for, or the methods to be employed in the disinfection of discharges from fever patients. A series of sedimentation basins were constructed along the lines of the three sewers from these localities. The exact location and the manner of constructing these basins are shown in the accompanying drawings. The construction of these basins was commenced on December 10 and they were completed and in operation by December 16.

Lime and copperas were used as precipitants in the first basin of each series, 70 pounds of lime and 20 pounds of copperas being added for this purpose.

The dosing of the basins was performed on an average every third day. That basins of this character, hastily constructed are capable of performing the work of sedimentation and destruction of dangerous bacilli in a very satisfactory manner and that these basins in particular did perform this work is shown by the result of the examinations of the sewage as it entered and emerged from each series. The relatively high proportion of bacteria in series No. 1, as compared to series Nos. 2 and 3 is due to the fact that the flow of No. 1 contains no surface or waste water, while Nos. 2 and 3 receive a varying proportion of both.

RESULTS OF EXAMINATIONS OF SEWAGE COLLECTED AT SEDIMENTATION BASINS.

1904.	Location.	Bacteria.	Acid formers.	Coli communis.
Jan. 1,	Inlet No. 1.	1,200,000	180	Positive.
	Outlet No. 1,	400,000	15	Positive.
	Inlet No. 2,	700,000	450	Positive.
	Outlet No. 2,	250,000	7	Negative.
	Inlet No. 3,	200,000	1,200	Positive.
	Outlet No. 3,	120,000	22	Negative.
5,	Inlet No. 1,	1,320,000	....	Positive.
	Outlet No. 1,	120,000	....	Positive.
	Inlet No. 2,	780,000	....	Positive.
	Outlet No. 2,	60,000	....	Negative.
	Inlet No. 3,	300,000	....	Positive.
	Outlet No. 3,	39,000	....	Negative.
8,	Inlet of No. 1,	1,100,000	....	Positive.
	Outlet of No. 1.	94,000	....	Negative.
	Inlet of No. 2,	450,000	....	Positive.
	Outlet of No. 2,	120,000	....	Negative.
	Inlet of No. 3,	900,000	....	Positive.
	Outlet of No. 3,	125,000	....	Negative.

An additional effort was made to secure the disinfection of excreta in bulk, by placing in the Butler County General Hospital, where a large number of cases of typhoid were being treated, a Morse-Boulger incinerator. The installation of this apparatus was completed December 20, since which time it has been in successful operation.

THE EXTENT OF THE EPIDEMIC.

As has been previously stated, the records of the Board of Health of Butler showed that up to November 1, 1903, two cases of typhoid fever had been reported for that year. No statistics were available for the month of November, and on December 2, the date on which the State Board of Health began operations, no records other than these were available, although it was admitted that typhoid fever was epidemic in the town.

A request to the physicians for a report of the number of cases under their individual care brought reports to the local Board of Health, up to and including December 1, of 1,123 cases. These reports, however, simply gave the total number of cases under treatment, and did not give individual records as to name, age, location date of beginning of illness, etc. From December 2, new cases as they came under the attention of the physicians were reported to the Board of Health on the regular blanks provided for this purpose, and gave detailed information in each case. The statistics given herewith of cases occurring previous to December 2 are the result of a careful canvas of the entire borough.

The total number of cases which may be included as having occurred during the present epidemic up to and including January 29 is 1,348. The order in which these cases occurred is as follows:

October, 47; November, 976; December, 222; January, 32, making a total of 1,277 cases, in which it was possible to secure an accurate record concerning the date of the beginning of their illness. Of the remaining 71 cases, 30 occurred among persons residing outside of the borough limits and 41 cases occurred in more distant parts of the State, as the direct result of infection in the town, in which it was impossible to secure accurate information concerning them. Reference to the tabulated statement showing the number of cases occurring on separate days indicates that typhoid fever existed in an unusual degree in Butler at a much earlier date than was popularly supposed to be the case, and that at the time of issuing the first warning to the public advising them to boil the drinking water November 9, typhoid fever had existed for 40 days to such an extent as to have caused alarm, had the conditions existing in October been known to the Board of Health. Two hundred and four cases are shown to have sickened from October 1, to November 9, and in view of this fact it could not be considered that typhoid fever had occurred suddenly in overwhelming numbers. In the interval between November 10 and November 20 we find that 516 cases sickened, the largest number for any single day during the epidemic being 110 on November 15. This period corresponds very closely to the period of incubation which would elapse from the dates on which it was admitted that the filters were out of service, viz: October 20, to November 2, and at which time water was pumped direct from the Connoquesnessing creek without filtration. The daily occurrence of a large number of cases over an extended period of time subsequent to the public notice to the people concerning the boiling of water on November 9 would indicate that the warning had not been promptly heeded, and that the verdict of the Board of Health concerning the necessity of boiling water had not been accepted with the unanimity which it deserved.

This conclusion is further born out by the published statements that were made concerning the uncertainty as to the true character of the prevailing disease, various causes other than water, principally fogs and excavations of earth being held responsible for the existing malady.

It was not until the latter part of November that the character of the disease seemed to be thoroughly recognized, and in fact it was not until the visit and proclamation of the State Board of Health on November 29, that the character and source of the disease were publicly and finally accepted.

In considering the possibility of unfiltered water having been supplied at other and much earlier dates than those which have been mentioned, viz: October 20, to November 2, and of this source being responsible for the occurrence of the 47 cases which were taken ill in October, it is interesting to consider the following publications:

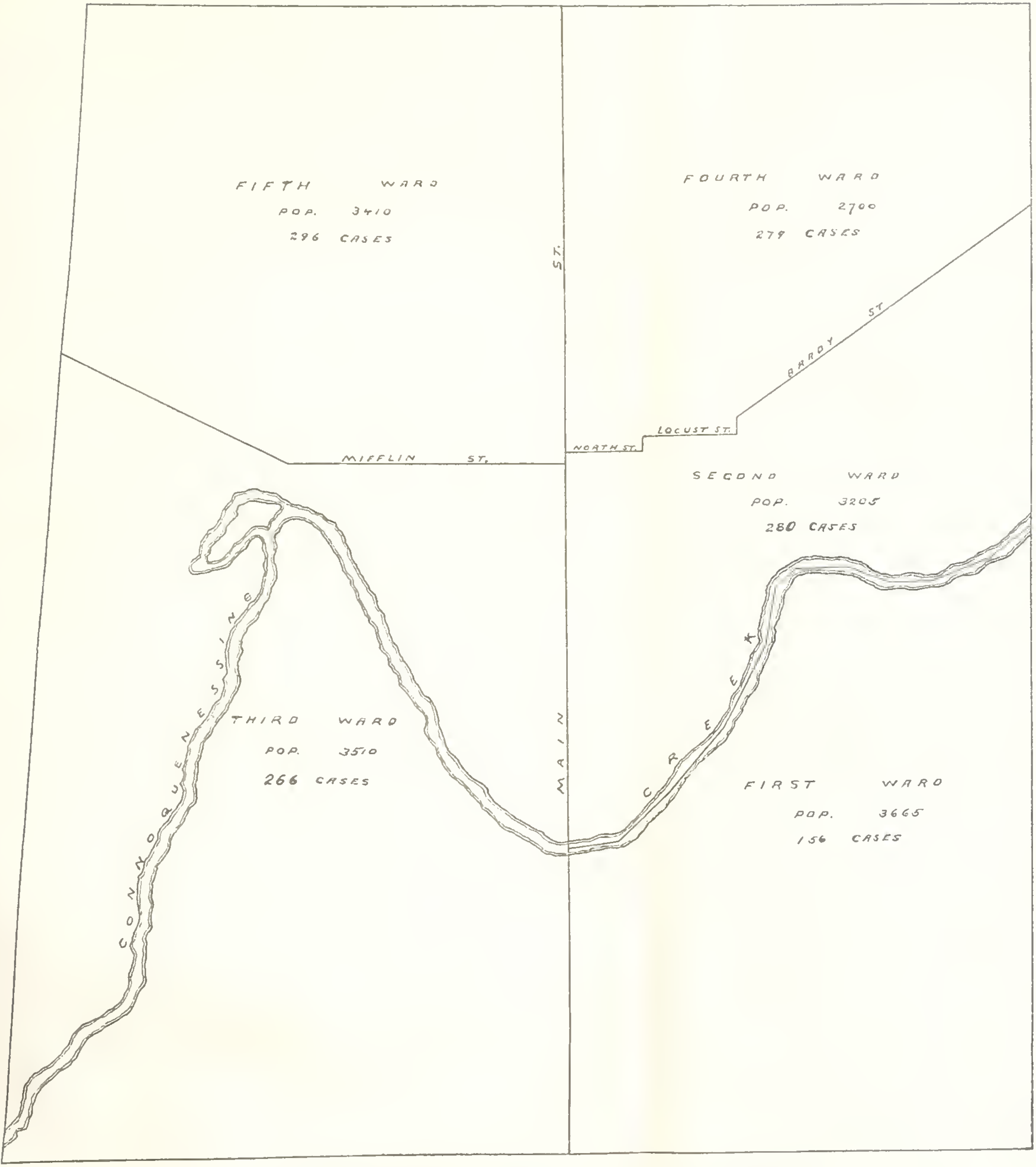
The Butler Times of October 9 published the following:

"Thursday morning something got wrong with the filter plant and it was comparatively out of commission but it will be repaired within the next few days, and Butler people will again have the use of the pure filtered water. For the present, however, consumers will have to be contented with the unfiltered fluid, which, on account of the recent heavy rains is rather muddy."

The same paper on October 12 makes the following statement:

"The water supplied to-day is much improved in appearance from that which was furnished last week, when the filter was out of commission."

These publications would indicate that during the early part of October the operation of the filter plant was either entirely suspended or in imperfect operation, as the quality of water furnished was of sufficient turbidity to cause comment by the consumers.



Plan of First, Second, Third, Fourth and Fifth Wards.

The distribution of cases throughout the borough according to wards is as follows:

	Population.	Cases.
First ward,	3,665	156
Second ward,	3,205	280
Third ward,	3,510	266
Fourth ward,	2,700	279
Fifth ward,	3,410	296

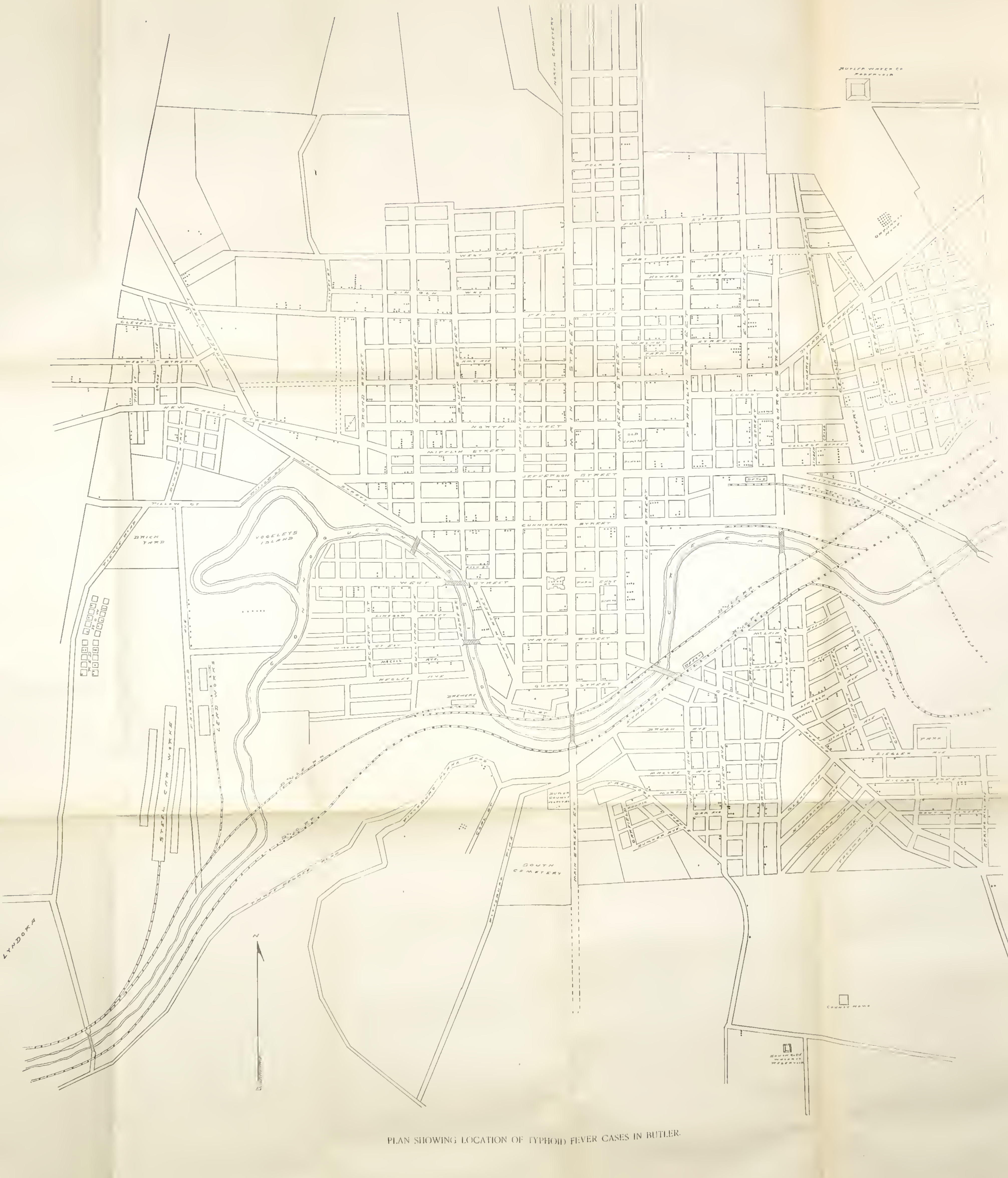
The disparity in the number of cases occurring in the First ward as compared with the remaining wards is believed to be entirely due to the fact that 152 residences in this ward are supplied with water from the wells of the Butler Mutual Water Association. The preponderance of cases in the Fifth ward is believed to be due to the fact that many new dwellings have been built in this ward in the past two years, in all of which city water has been introduced. The number of private wells in this section is few in comparison with the older sections of the borough.

While all classes of people were affected by the fever, probably the more prosperous suffered to the greatest degree, as many of the poorer residents, whose dwellings were not supplied with the modern convenience of running water escaped infection.

Number of cases occurring October 1,	3
Number of cases occurring October 2,	0
Number of cases occurring October 3,	0
Number of cases occurring October 4,	1
Number of cases occurring October 5,	1
Number of cases occurring October 6,	0
Number of cases occurring October 7,	2
Number of cases occurring October 8,	0
Number of cases occurring October 9,	1
Number of cases occurring October 10,	1
Number of cases occurring October 11,	1
Number of cases occurring October 12,	1
Number of cases occurring October 13,	1
Number of cases occurring October 14,	2
Number of cases occurring October 15,	3
Number of cases occurring October 16,	2
Number of cases occurring October 17,	2
Number of cases occurring October 18,	0
Number of cases occurring October 19,	0
Number of cases occurring October 20,	3
Number of cases occurring October 21,	0
Number of cases occurring October 22,	0

Number of cases occurring October 23,	0
Number of cases occurring October 24,	0
Number of cases occurring October 25,	4
Number of cases occurring October 26,	4
Number of cases occurring October 27,	1
Number of cases occurring October 28,	3
Number of cases occurring October 29,	1
Number of cases occurring October 30,	8
Number of cases occurring October 31,	2
	47

Number of cases occurring November 1,	40
Number of cases occurring November 2,	17
Number of cases occurring November 3,	9
Number of cases occurring November 4,	12
Number of cases occurring November 5,	13
Number of cases occurring November 6,	11
Number of cases occurring November 7,	14
Number of cases occurring November 8,	27
Number of cases occurring November 9,	15
Number of cases occurring November 10,	52
Number of cases occurring November 11,	18
Number of cases occurring November 12,	44
Number of cases occurring November 13,	27
Number of cases occurring November 14,	44
Number of cases occurring November 15,	110
Number of cases occurring November 16,	31
Number of cases occurring November 17,	41
Number of cases occurring November 18,	36
Number of cases occurring November 19,	36
Number of cases occurring November 20,	77
Number of cases occurring November 21,	25
Number of cases occurring November 22,	32
Number of cases occurring November 23,	34
Number of cases occurring November 24,	28
Number of cases occurring November 25,	48
Number of cases occurring November 26,	45
Number of cases occurring November 27,	20
Number of cases occurring November 28,	30
Number of cases occurring November 29,	16
Number of cases occurring November 30,	24
	976



PLAN SHOWING LOCATION OF TYPHOID FEVER CASES IN BUTLER.

Number of cases occurring December 1,	64
Number of cases occurring December 2,	19
Number of cases occurring December 3,	14
Number of cases occurring December 4,	13
Number of cases occurring December 5,	16
Number of cases occurring December 6,	12
Number of cases occurring December 7,	5
Number of cases occurring December 8,	8
Number of cases occurring December 9,	4
Number of cases occurring December 10,	4
Number of cases occurring December 11,	2
Number of cases occurring December 12,	6
Number of cases occurring December 13,	2
Number of cases occurring December 14,	4
Number of cases occurring December 15,	15
Number of cases occurring December 16,	2
Number of cases occurring December 17,	1
Number of cases occurring December 18,	2
Number of cases occurring December 19,	4
Number of cases occurring December 20,	1
Number of cases occurring December 21,	0
Number of cases occurring December 22,	1
Number of cases occurring December 23,	4
Number of cases occurring December 24,	6
Number of cases occurring December 25,	1
Number of cases occurring December 26,	2
Number of cases occurring December 27,	4
Number of cases occurring December 28,	2
Number of cases occurring December 29,	1
Number of cases occurring December 30,	2
Number of cases occurring December 31,	1
	222

Number of cases occurring January 1,	2
Number of cases occurring January 2,	0
Number of cases occurring January 3,	3
Number of cases occurring January 4,	1
Number of cases occurring January 5,	1
Number of cases occurring January 6,	0
Number of cases occurring January 7,	2
Number of cases occurring January 8,	2
Number of cases occurring January 10,	2
Number of cases occurring January 11,	2
Number of cases occurring January 12,	2

Number of cases occurring January 13,	0
Number of cases occurring January 14,	0
Number of cases occurring January 15,	0
Number of cases occurring January 16,	2
Number of cases occurring January 17,	0
Number of cases occurring January 18,	3
Number of cases occurring January 19,	1
Number of cases occurring January 20,	1
Number of cases occurring January 21,	3
Number of cases occurring January 22,	0
Number of cases occurring January 23,	2
Number of cases occurring January 24,	0
Number of cases occurring January 25,	1
Number of cases occurring January 26,	0
Number of cases occurring January 27,	0
Number of cases occurring January 28,	1
Number of cases occurring January 29,	1
	32

The ages of the persons infected were found to be as follows:

Under five years,	76
Between five and ten years,	216
Between ten and fifteen years,	243
Between fifteen and twenty years,	184
Between twenty and thirty years,	287
Between thirty and forty years,	145
Between forty and fifty years,	81
Over fifty years,	45

The total number of deaths due to the epidemic has been 111. Ninety-six of this number occurred in the borough, and the remaining fifteen occurred among those who upon the first evidence of illness had gone to their homes, or who had been taken ill within a few days after a sojourn in Butler. The ages at which the deaths occurred were as follows:

Under five years, 2 being 2.6 per cent.
Between five and ten years, 3 being 1.4 per cent.
Between ten and fifteen years, 6 being 2.5 per cent.
Between fifteen and twenty years, 15 being 8.1 per cent.
Between twenty and thirty years, 25 being 8.7 per cent.
Between thirty and forty years, 19 being 13.1 per cent.
Between forty and fifty years, 15 being 18.5 per cent.
Over fifty years, 11 being 24.4 per cent.

Of the 1,277 cases remaining for treatment in Butler, 153 of this number were cared for in hospitals and 1,124 were treated in their homes.

In reviewing the history of events which occurred previous to the epidemic of typhoid fever in Butler it is interesting to know that no suspicion of the water supply had entered the minds of the people after the destruction of the Boydstown reservoir, on August 28. How far they were misled by published statements or who may have been responsible for these statements is a matter for conjecture, but the fact remains that the local Board of Health and the people of Butler were entirely ignorant of the real source of supply subsequent to the 28th day of August.

On August 28, immediately following the destruction of the Boydstown reservoir the Butler Times issued the following statement:

"Speaking of the water supply, Mr. Wright informed this paper that the Butler people need have no fear about the company's not having a sufficient supply of water for the immediate needs of the city." "The town," he said, "will not be without water for a moment because of the breaking of the dam. Their supply of water without the dam is ample for a town many times the size of Butler, and the city will suffer no inconvenience.

The new storage dam can be made ready for emergency service at any time now, and all that will be required should there be necessity for more water than the company's other facilities could supply, would be to close the gates, and it would soon fill with water. The laying of a few joints of pipe would connect the new dam with the pipe-lines to the city."

"With characteristic enterprise, Superintendent Wright has taken hold of matters up at the dam, and Butlerites can rest assured that he will look after the safety of the town in every particular, and that there will be an abundant supply of water for all purposes."

Also in the same publication, on August 29, 1903, the following appears:

"Although Supt. Wright of the Butler Water Company anticipates no trouble in furnishing the people of Butler with an ample supply of good water, even though the big dam has been washed away, he has issued a circular letter to more than 2,000 patrons of the company, asking them to exercise care in the use of the water during September and October. These months have been the dryest of the year in this section and the company wants the people to be exceptionally careful during these coming 60 days.

There will be water enough for all consumers for legitimate uses, but there will be none to waste. No time will be lost by the company in restoring the old dam at Boydstown to usefulness, but before the breach in the dam is permanently repaired, a work which will require some time, as the company will make it absolutely solid, a coffer dam, 16 feet in heighth will be constructed to close the opening in the old dam. Work on this temporary structure will probably be commenced on Monday, as the company intend not to lose a moment's time in getting the storage dam back into commission again.

When the coffer dam is completed it will have a capacity for storing from 25,000,000 to 30,000,000 gallons of water, no small amount, but only one-tenth the capacity of the old dam. The gates at the new dam on Thorn's Run about two miles west of Butler, and about four miles from the old dam, and in another valley from the one which supplies water to the Boydstown dam were closed on Friday afternoon, and by evening there was about 20,000,000 gallons of water stored back of the new dam.

This dam, which was previously described at length in this paper is of sufficient size to furnish water for a town a dozen times the size of Greater Butler. This dam has not been connected with the pipe lines to Butler, but only a few hours work will be necessary to make it an actual part of the Butler Water system, whenever the superintendent decides the water from it will be needed. For the present, the company has an ample supply of water in the reservoir, but will take no chances on not having enough, so that the new dam, although months yet from actual completion, may be connected up with the system at any time."

The issue of the same periodical on September 4 contained the following:

"Work has been started by the Butler Water Company on the construction of the coffer dam at Boydstown, to take the place temporarily of the big dam which was washed away by the flood on last Friday morning. This work will not require a great deal of time, as the coffer dam is not intended to be of a permanent nature, but only to keep a fair supply of reserve water on hand for the company until the permanent improvements at Thorn Run where the storage lake is located are completed, and the water from the new section ready to turn into the company's lines. At present there is quite an amount of water in the new dam, but the coffer dam, when completed is expected to furnish an ample supply of water so that the Thorn Run improvements will not need to be hastened to any extent which might interfere in any way with the permanency of the work."

More than one month later the same publication on October 9th published the following:

The work of improving the splendid plant of the Butler Water Company which has been in progress for several months is progress-ing quite rapidly, and on Thursday P. M. for the first time, water from the new storage dam, east of the city was pumped into the big reservoir on the hill back of the Orphans' Home property.

This dam has not been entirely completed, but within the coming week the cement work on the core of the dam will be finished."

In view of the fact that no coffer dam such as is referred to in these articles was built at the Boydstown reservoir, that the Thorn Run reservoir was not completed and water drawn from it for distribution until November 15, and that the reservoir spoken of as containing an ample supply in reality contained sufficient for only one day's consumption, it is difficult to understand the authority for these publications, or to estimate how far-reaching their effect was in misleading the public as to the real source of supply.

The conclusions to be drawn from a review of the facts as they have been found to exist are that, following the destruction of the Boydstown dam on August 28, water for distribution to the people of Butler was taken from the Connoquenessing creek through an emergency intake at the pumping station; an examination of the waters of this creek showed that it maintains a fairly constant evidence of pollution, and that at various periods the operation of the filter plant designed to remove such pollution was partially or entirely suspended; and that as a result of this polluted water being used for domestic purposes, 1,348 persons who so used it were stricken with typhoid fever between October 1, 1903, and January 29, 1904, with 111 fatalities.

In comparison with other epidemics of typhoid fever which have occurred at different periods, Butler presents in point of numbers, one of the greatest epidemics in proportion to the population in the history of the world. The records in comparison with certain other epidemics being as follows:

Location.	Date.	Population.	Cases.	Deaths.
Lausen, Switzerland,	1872	780	144	....
Caterham, England,	1879	5,800	352	21
Plymouth, Pa.,	1885	8,000	1,104	114
Ithaca, N. Y.,	1903	13,000	1,300	78
Butler, Pa.,	1903 and 1904	18,000	1,348	111

It will be noticed from these statistics that Pennsylvania, within the last score of years has contributed two of the most serious epidemics of a preventable disease which have occurred in recent years.

This epidemic illustrates the serious burden of responsibility which rests upon both municipal and private corporations engaged in supplying water for domestic uses, and at the same time demonstrates that the streams of our State even in comparatively remote sections are capable of receiving such serious contamination that they should become the objects of the most careful supervision on the part of local and State authorities.

That such a distressing calamity could occur in a community which prided itself on the safeguards of storage and filtration which they had provided, naturally excites the greatest anxiety concerning those very numerous communities which have no such protection.

The efforts which have been made to secure a pure water supply for Butler have been of a far more energetic character than the very great majority of our municipalities have made.

While ample storage has been provided for raw water and competent filters have been installed, the Butler system yet lacks the storage facilities for filtered water which would safeguard the town in event of enforced suspension of filtration for a period greater than twenty-four hours.

The efficiency of filtration as a means of purifying water has been well illustrated in this instance, for although the polluted water of the Connoquenessing creek was used from August 28, to November 15, typhoid fever did not occur until the operation of the filter plant was interrupted in October. No object lesson to be learned from the epidemic can be compared however with the necessity which has been shown to exist for the compulsory registration by physicians of contagious and infectious diseases occurring in rural districts.

RELIEF COMMITTEE WORK.

The work performed by the relief committee of Butler in connection with the epidemic of typhoid fever was of such great importance and so effective in its results as to play a very consequential part in securing the rapid abatement of the disease as well as relieving suffering and want. This work was of such magnitude and of such extensive detail that the full comprehension of it must be left to the report of the committee which will be published in detail at a later time. The manner in which the affairs of the committee have been administered testify most eloquently to the intelligence, integrity, earnestness and unselfishness of those who have devoted both their substance and time to the relief of their stricken fellow-townspeople.

The appeal for aid made by this committee to the people at large, met with that prompt and generous response which has ever characterized the actions of the American public under similar circumstances. No hamlet was too small, or no city too large to contribute of its wealth for the relief of Butler. The work of the Philadelphia Permanent Relief Committee is worthy of particular mention for the reason that the aid extended was of such a practical character and productive of such excellent results.

Twenty-five trained nurses were dispatched from that city in charge of Dr. M. S. French and Dr. David Huston, under whose direction a temporary hospital was equipped which was of the greatest value in caring for those persons who were unable to receive skilled care and attention in their homes. Too much credit can not be given to that little army of nurses who individually responded to the call for assistance and who performed their arduous duties under the most adverse conditions of weather and environment.

Respectfully submitted,
WILMER R. BATT,
Quarantine Officer-at-Large.

REPORT OF GEO. R. HARLOW, C. E. ENGINEER INSPECTOR.

Wilkinsburg, Pa., January 26, 1904.

Benjamin Lee, M. D., Secretary State Board of Health:

Dear Sir: In accordance with your instructions of December 3, 1903, I went to Butler on Monday, December 7, and returned on Saturday, December 12. My specific instructions were "to investigate the sanitary condition of said borough with reference to the pollution of its water supply and to an epidemic of typhoid fever, examining into all sources of possible contamination, the filter plant, the new dam as to its mode of construction, and the old dam, indicating the reasons for its giving away."

Butler borough is the capital of Butler county, Pennsylvania. It is situated on Connoquenessing creek within ten miles of its source. It is near the summit of the land lying between the valleys of the Beaver and the Allegheny rivers. There is no other available source of water supply except the Connoquenessing and its tributaries.

According to the census of 1880, Butler had 3,163 inhabitants. The census of 1890 shows 8,734, and the census of 1900, 10,853. During the last two years Butler has increased in population fifty per cent. The building of the Standard Steel Car Company's works has made a new village adjoining Butler on the southwest. This village is called Lyndora. The combined population of the two is said to be 18,000.

The Butler Water Company has since 1878 supplied the borough of Butler with water. Its pump station was then placed in its present location northeast of the borough on the banks of the Connoquenessing. Up to 1896 all the water pumped was taken from the creek at this point. At that date owing to the shortage of supply in the dry seasons a collecting reservoir was made on the Connoquenessing at Boydstown about seven miles above Butler. This reservoir collects the rainfall from an area of fourteen and a half square miles and has a capacity of 100,000,000 gallons. The water flows from the dam to the pump house through a line of vitrified and cast iron pipe.

In 1897 the stock of the Butler Water Company was sold by its old owners to the American Water Works and Guarantee Company. Soon after this sale a flood washed out a part of the Boydstown dam. This dam was originally made of clay with a spill-way of too small capacity in the middle of the dam. The part washed out was rebuilt of clay with a masonry core-wall extending from the bottom to the top. The spill-way was increased in size and located on the natural ground on the left bank of the stream.

On August 27, 1903, there was a remarkable rain. This filled the reservoir and the spill-way being too small to carry off the flood, the water flowed over the top of the dam. There being no core-wall in that part of the original dam which was not rebuilt in 1897 it was speedily washed away. The flood caused by the giving away of this dam raised the water at Butler about a foot above that caused by the cloudburst itself.

This dam is now rebuilt, the masonry core-wall being continued its whole length. The spill-way has been increased in capacity again by making a drop of thirty inches in the channel at the line of the upper face of the dam. There are two blow-off valves, one twenty-four and other sixteen inches in diameter, with keys to open them at the dam. The width of the spill-way is 55 feet at the bottom and about 63 at the height of the top of the dam. The wall of the spill-way next the dam is vertical and 6.7 feet in heighth. The other side of the spill-way is built on a slope of about one horizontal to one vertical. The floor of the spill-way is of concrete.

I believe as it is now constructed with the core-wall extending the entire length of the dam and built up to the top of the fill, and the spill-way increased in capacity that this dam is safe. The blow-off valves can be opened if it is apprehended that there is any danger of the water overflowing the dam.

In order to meet the increased demand for water due to the rapid growth of Butler and vicinity, the Butler Water Company were largely increasing their plant. One item was locating and contructing a large storage reservoir on Thorn Run, a tributary of the Connoquenessing below the Boydstown dam and above the pump station. This reservoir has a capacity of 220,000,000 gallons and collects the rain-fall from an area of six and a half square miles. The dam was completed but a short time preceding my visit. I was pleased with the appearance of the work. This dam is made of clay with a concrete core-wall. In the deepest portion of the dam a ditch was dug five feet in depth. Sheet piling was driven twenty feet below the bottom of this ditch. The concrete core-wall was started so that the tops of the sheet piling extend up into it. It is five feet wide at this depth and batters off till at the top it is eighteen inches wide. The clay was filled in on both sides of this core-wall in thin layers and rammed. The dam is covered on its upper slope with a layer of stone. All the flooded area has been stripped of soil to a depth of six inches. The spill-way is built on the natural ground on the right bank. It is made of concrete and masonry, is 50 feet wide and the side walls are five feet high. There are two blow-off valves, one twenty and the other twenty-four inches in diameter. I have no apprehension that this dam will ever be overflowed causing it to give way.

The water from this dam flows to the pump house through a line of cast iron pipe, sixteen inches in diameter to the point where it joins the pipe from the Boydstown dam. From this point the water from both reservoirs is carried in a cast iron pipe twenty inches in diameter, which is increased at a point nearer to the pump station to twenty-four inches.

I am told that at the pump station nothing of the original plant remains except the well from which the water was pumped. The main building contains the pump and boiler rooms. Connected to it is the filter house. In the boiler room are the boilers and work benches. In the pump room are five pumps. The largest of these is a new pump rated at 5,000,000 gallons capacity in twenty-four hours. This was not quite ready to be run at my visit. There were two pumps each rated at 2,000,000 gallons. These were being used for the daily supply. There was a small pump that could be used in an emergency. The fifth pump was used to pump the water from a receiving well to the top of the filters. It is only necessary to use this pump when the water is taken direct from the creek or from the Boydstown reservoir. The water in the Thorn Run reservoir has had enough to deliver it to the filters. There is a sixth pump in the room that joins the pump and filter houses intended as an auxiliary to the low lift pump.

In the filter house are the filters. These consist of six tanks each fifteen feet in diameter and eight feet in height. The method of filtration is that called the rapid or mechanical. Before reaching the filters a measured quantity of sulphate of alumina is added for a coagulant. The quantity of water delivered to each tank is controlled by an automatic valve so that the tanks do not overflow. The water is delivered at the top of the tanks on a filtering bed of sand three and a half feet deep lying on a six inch bed of gravel. After passing the gravel it is received in a filtered water well under the filter house. This well is thirty-five feet four inches wide and thirty-seven feet four inches long. These tanks are so constructed so that one or more may be used. The first four of these filters were erected and in operation early in June, 1902. Up to this time unfiltered water only was furnished. The two others were erected in August, 1903.

During the week ending October 5, 1901, the Water Company pumped 8,000,000 gallons of water. During the week ending October 4, 1902, 11,000,000 gallons were pumped. In the week ending October 3, 1903, 20,000,000 gallons were pumped. Thus in two years while the population, had increased fifty per cent. the pumpage had increased one hundred and fifty per cent. To provide for this increase kept the Water Company busy. They laid a new force main from the pumps to the distributing reservoir on the hill above town, and distributing mains from this reservoir through Butler to Lyndora. They were building the dam on Thorn Run, rebuilding the Boydstown dam, putting in new filters, and the new pump. To get this new pump available it was necessary to connect its suction line to the filtered water well. To do this it was necessary to stop the filters and take down the side of the filtered water well. This was done as near as the date can be ascertained on the 20th of October, and the work was finished in about ten days. Within two weeks typhoid fever was prevalent to an alarming extent in Butler. Dr. Wilmer R. Batt, Quarantine Officer in Charge for the State Board of Health informed me that from November 1, to December 7, in Butler borough alone there had been 1,178 cases. There were 44 additional cases reported up to December 11. It is common report that at this date the epidemic is over.

The epidemic itself is proof that the filters are doing their work in a satisfactory manner. For if while they were in constant use, there was little typhoid fever in Butler, and immediately after their temporary nonuse typhoid occurs in epidemic form, the water being pumped at both times from the same place, proves their effectiveness.

While I was there the Water Company were having daily tests of the filtered water and found nothing suspicious in it. After the Boydstown dam gave out it was necessary to get the water from the creek at the pump station. And this was continued until early in November. During all this time there were typhoid cases on the Connoquenessing and its tributaries. Dr. T. N. McKee, Medical Examiner of the State Board of Health made known to me the cases of typhoid already located on the water-shed, and together we examined the remainder.

In a small house on the right bank of Thorn Run and just above the breast of the reservoir dam have been four cases of typhoid fever since July. Before my visit ditches had been dug to carry off all the surface drainage that could be contaminated from this house, and deliver it below this reservoir. In another small house about a quarter of a mile above the pump station were two cases the first of which occurred in September. Either of these cases may have contaminated the Connoquenessing at the time the filters were out of use.

But these were not the only cases occurring on the water-shed. In the drainage area below the Boydstown dam cases were located occurring in 1902, and on the runs flowing into the Connoquenessing eight cases have occurred since 1900. At Greece City and in its vicinity, and in the vicinity of the Boydstown dam we located eight cases occurring between August and the date of our visit.

Thus it appears that any dwelling on the drainage area may be a source of possible contamination.

With pollution possible at all times to the source of supply, the public health demands that the Butler Water Company shall continuously filter all the water delivered to its distributing reservoir. But it is due to the Water Company that it be protected from the pollution of its source of supply.

I would suggest that every physician be required to report to the county-seat all cases of typhoid attended by him, and that a proper officer see that the family shall properly sterilize all wastes from the patient.

The sewerage of Butler borough is discharged into the Connoquenessing without any attempt at purification. This stream is the source of supply in full or in part for Zelienople, Ellwood City and Beaver Falls. The day is coming when every municipality must purify its sewerage before returning it to the water courses again.

In part the responsibility for this epidemic is due to the State of Pennsylvania in that there are no adequate laws protecting the purity of water in the rivers and streams.

Respectfully submitted,
GEORGE R. HARLOW,
Engineer Inspector.

COMMONWEALTH OF PENNSYLVANIA.

THE STATE BOARD OF HEALTH.

THE OPERATIONS

OF THE

STATE BOARD OF HEALTH OF PENNSYLVANIA.

IN SUPPRESSING THE

EPIDEMIC OF TYPHOID FEVER IN BUTLER, PENNSYLVANIA,

IN 1903-1904.

Report of the Secretary, Including Minutes of the Board.
Report of Dr. Wilmer R. Batt, Quarantine Officer-at Large,
Comprising Report of Services Rendered by Dr. John W.
Adams, Veterinarian to the Board, and Dr. T. N. Mc-
Kee, Quarantine Officer of the Board for Arms-
trong County and Report of George R. Har-
low, C. E., Engineer Inspector for
the Western District.

(Extracted from the Twentieth Annual Report of the State Board of Health.)

WM. STANLEY RAY,
STATE PRINTER OF PENNSYLVANIA,
1904.